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*Sanitary Sewer
Element*

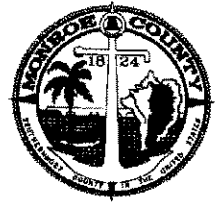


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10.0 Sanitary Sewer Element

The treatment of sewage and the disposal of wastewater within unincorporated Monroe County has traditionally been accomplished through either on-site treatment and disposal involving the use of septic tanks or small and intermediate sized, privately-owned wastewater treatment package plants. Factors such as rapid growth and the reliance upon private enterprise for the construction and operation of wastewater treatment facilities has caused a proliferation of small package treatment plants and an enormous inventory of individual septic tanks. Current wastewater treatment practices combined with severely limited soils and high land use densities result in increased potential for ground and surface water contamination. The inventory and analysis of data contained herein address existing and future conditions within the context of the Florida Keys' designation as an "Area of Critical State Concern," and the designation of adjacent waters as "Outstanding Florida Waters."

While a number of preliminary studies and reports have been generated in recent years regarding nutrient contamination of nearshore water quality in the Florida Keys, none have been conducted as a part of a coherently-designed scientific evaluation of all potential sources of contamination throughout Monroe County. The Board of County Commissioners has recognized this and has committed to the preparation and implementation of a Sanitary Wastewater and Stormwater Management Master Plan (SW/SMMP) and implementation resulting in improvement to nearshore water quality.

10.1 Regulatory Framework

10.1.1 Federal Regulations

The Federal Water Pollution Control Act (PL 92-500) is the controlling national legislation relating to the provision of sanitary sewer service. The goal of this act is the restoration and/or maintenance of the chemical, physical and biological integrity of the nation's waters. The Act established the national policy aimed at implementing area-wide waste treatment and management programs to ensure adequate control of pollutant sources. Under Section 201 of PL 92-500, grants were made available to local governments to construct facilities to treat "point sources" of pollution, which include effluent from sewage treatment processes. The U.S. Environment Protection Agency is responsible for implementing the Act. During the 1970's Federal grant monies were generally available to local governments showing a need for expanded sewage treatment capacity, but today such funds are scarce.

10.1.2 State Regulations

The Florida Department of Environmental Regulation (DER) is responsible for ensuring that the State carries out responsibilities assigned to it under PL 92-500. DER has adopted rules for the regulation of wastewater facilities in Chapter 17-6, F.A.C. These rules apply to facilities which treat flows exceeding 10,000 gallons per day for domestic establishments, 5,000 gallons per day for food service establishments, and where the sewage contains industrial, toxic or hazardous chemical waste.

Recognition of the nearshore waters of the Florida Keys as a resource of the highest order spurred protective legislation in 1974 designating the Florida Keys as an "Area of Critical State Concern," under Chapter 380 of the Florida Statutes. Ten years later, "The Principles for Guiding Development in the Florida Keys Area of Critical State Concern" were adopted to "insure a water management system that will reverse the deterioration of water quality and provide optimum utilization of our limited aquatic resources, facilitate orderly and well-planned development, and protect the health, welfare, safety, and quality of life of the residents of this state."

Class III surface waters of the Florida Keys, in addition were classified in 1985 as "Outstanding Florida Waters" (OFW's), and as such, may not be degraded as a result of any human activity or discharge. Class III water quality criteria provided in Florida's Administrative Code apply to the OFW's of the Florida Keys. Rule 17-3 states that DER considers excessive nutrients (total nitrogen and total phosphorous) to be "one of the most severe water quality problems facing the State." Section 17-3.041 gives special protection to the Florida Keys as OFW's. OFW is the highest protection, in areas which have exceptional recreational or ecological significance, and includes all the Florida Keys except the Key West outfall, Stock Island power plant mixing zone, and certain artificial water bodies (see Section 10.3.2). Compliance with OFW requirements relates only to sources permitted after the OFW designation.

The Florida Department of Health and Rehabilitation Services (HRS) regulates septic tank and drainfield installation within the State. These requirements have been adopted by rule in Chapter 10D-6, F.A.C., which specify capacity limits (5,000/10,000 GPD) and drainfield design criteria. Chapter 381.272(12), F.S., (On-site Sewage Disposal Systems; Installations; Conditions) also required the HRS to promulgate a special rule authorizing such systems in the unique geology of the Florida Keys and portions of Dade County "which take into consideration these unique soil conditions, and which consider water table elevations, densities, and setback requirements." Part II of Chapter 10D-6 F.A.C., became effective on July 15, 1986, pursuant to the aforementioned section. Chapter 10D-6, Part II is currently under revision by HRS to provide additional criteria for the protection of public health.

According to Section 10D-6.41 (8)(a) (b) and (c), any wastewater which contains industrial or toxic waste is prohibited from septic tanks. In addition, areas zoned for industrial or manufacturing, or its equivalent, are prohibited from using septic tanks unless the use is for domestic waste disposal. Food establishments generating more than 5,000 gallons a day are also prohibited from using septic tanks. In Monroe County the DER reviews building permits for commercial use to determine if the original use is a generator of hazardous or toxic waste. Examples of uses which would not be permitted to use a septic tank are dry cleaners, printers, and photo labs. Rule 10D-6.061(4), F.A.C. further specifies that:

"subdivisions and lots platted after December 31, 1971, and served by a public water system or cisterns may be developed utilizing on-site sewage disposal systems provided there are no more than four lots per acre. Subdivisions and lots platted after December 31, 1971, may be developed with private potable wells and on-site sewage disposal systems provided each lot has a minimum area of at least 1/2 acre. For lots platted prior to 1972, minimum lot size requirements shall not apply."

Chapter 381.272, F.S. requires that every on-site disposal system except approved grey water systems connect to a publicly or investor owned sewage system within 365 days after such a system is available. Monroe County should require that notification of this state requirement be placed on any building permit issued for development associated with the use of OSDS in order to emphasize to owners or developers that the use of OSDS may be a temporary sewage disposal method in the event that publicly or privately owned sewage systems become available. In addition, provisions must be made for the inclusion of sewer utility easements and right-of-way in a subdivision and the developer is required to notify the buyer of a lot of the provisions contained in Chapter 381.272 F.S.

10.1.3 Local Regulations

At the present time, the treatment and disposal of sewage in Monroe County is provided by the private sector. There are no public sewage treatment facilities operating in the unincorporated County. Accordingly, aside from current County Code requirements which mandate OSDS inspections every three years and prohibit OSDS in salt marsh and buttonwood areas, regulation is provided solely by the HRS and the DER.

Enabling legislation currently exists for the establishment of public sewer systems in Monroe County. As enacted by the Florida State Legislature, the Florida Keys Aqueduct Authority (FKAA) retains legal jurisdiction to purchase, construct, manage and operate sewage collection, treatment and disposal services to any entity or area of the County. The Authority has the power to create sewer districts covering any area of the County, subject to approval by the Board of County Commissioners for Monroe County. At present, the FKAA has yet to exercise this jurisdiction as no centralized sanitary sewer systems have been constructed.

10.2 Existing Facilities

Sanitary sewer facilities operating in unincorporated Monroe County consist of regulated and unregulated on-site disposal systems (OSDS) and package treatment plants. At the present time approximately 65 percent of the wastewater flow is treated by OSDS. The remaining 35 percent of the flow is treated by package treatment plants. Aside from the City of Key West's sewage system, no publicly operated wastewater treatment facilities are in operation in Monroe County. The existing inventory of sewage facilities in Monroe County includes approximately 24,000 septic tanks regulated by HRS, 193 small package treatment plants regulated by DER in unincorporated Monroe County, 99 marinas and 15,000 boats regulated by the U.S. Coast Guard, and 5000 unpermitted and unregulated cesspools. Commercial facilities (such as restaurants, motels, and campgrounds) and multiple-family dwellings (condominium and apartment buildings) are served by "package" plants, ranging in capacity from 0.002 to 0.6 million gallons/day (MGD). All of these package plants serve site specific projects and are privately owned, operated and maintained. One and two-family dwellings commonly use septic tanks, and at the present time, many campgrounds and mobile home parks in the County are also serviced by septic tanks.

As previously indicated, the Florida Keys Aqueduct Authority (FKAA) through its enabling legislation has the power to create sewer districts within the geographic boundaries of its service area upon approval of the majority of the County Commission. The Authority has power to impose the necessary fees and other charges required to construct and operate sewage collection, treatment and disposal

facilities. The FKAA has not formally initiated any studies or other implementation activities to date. During the implementation of the policies contained in the Comprehensive Plan, the County, in conjunction with the FKAA and other entities, will undertake the development of a Sanitary Wastewater/Stormwater Management Master Plan (SW/SMMP) for all of the unincorporated County. Policies adopted by the Monroe County Commission during the development of the Comprehensive Plan will serve as the guidelines for the development of the parameters under which the SW/SMMP will be undertaken. At the present time it is anticipated that the SW/SMMP will be completed by October 1999. To the greatest extent feasible, the SW/SMMP will be implemented through amendments to the Monroe County Land Development Regulations when definitive conclusions have been reached.

10.2.1 On-Site Disposal Systems

The State of Florida Department of Health and Rehabilitative Services (HRS) is the entity responsible for the issuance of permits for on-site disposal systems. Chapter 10D-6 F.A.C., Standards for On-site Sewage Disposal Systems, provides the regulatory framework under which the HRS regulates on-site disposal systems. Chapter 10D-6 F.A.C. sets forth the state wide density standards related to the utilization of on-site disposal systems as follows:

10-D6.061 F.A.C. (4) Subdivisions and lots platted after December 31, 1971 and served by a public water system or cisterns may be developed utilizing on-site sewage disposal systems provided there are no more than four (4) lots per acre. Subdivisions and lots platted after December 31, 1971 may be developed with private potable wells and on-site sewage disposal systems provided each lot has a minimum area of at least 1/2 acre. For lots platted prior to 1972 minimum lot size requirements shall not apply (emphasis added).

The provision of 10D-6 F.A.C., which allows for an exemption of the minimum lot size requirements for lots platted prior to 1972, has serious ramifications in the Keys in that of the 15,000 platted buildable lots approximately 90 to 95 percent are pre-1972. If the State requirements are the only regulations which must be adhered to relative to installation of on-site disposal systems (the Monroe County Land Development Regulations specifically reference Chapter 10D-6 as the County requirements) much of the platted land in the Keys might be considered to be exempt from the density standards pertaining to the application of OSDS.

The most common type of on-site sewage disposal system (OSDS) in Monroe County is the septic tank system. The basic septic tank system consists of two components:

- (1) A buried tank to collect waterborne domestic wastes and allow scum, grease, and settleable solids to be removed from the liquid by gravity separation; and
- (2) A subsurface soil absorption system to allow clarified effluent to percolate into the soil and eventually reach the ground water.

Within Monroe County as a whole, on-site disposal systems currently includes approximately 24,000 septic tanks and 5,000 cesspools. These septic tanks and cesspools are being mapped in conjunction with preparation of the Comprehensive Plan. This mapping effort will be utilized during the initial phases of the SW/SMMP. The most commonly used septic tank system in Monroe County is the single

tank system. Standards for on-site wastewater treatment facilities have been established for Monroe County by HRS and are implemented by the Monroe County Department of Health.

As part of Florida's OSDS research project, all county environmental health programs were surveyed in August 1986 by the HRS. Results of this survey for Monroe County show that 641 OSDS permits were issued in 1983, 713 were issued in 1984, 1979 were issued in 1985, and approximately 1500 were issued in 1986, with 95 percent of the systems located in platted subdivisions. The types of OSDS systems installed during this time are shown in Table 10.1.

Table 10.1
Types of OSDS and Use, By Percentage

System	1984	1985	1986
Conventional Septic Tank/ Drainfield Systems:			
Trenches	0%	0%	0%
Beds	60%	54%	44%
Systems in Fill (excl. mounds)	35%	38%	40%
Mound Systems	5%	7%	10%
Graveless Systems	0%	0%	0%
Blackwater/Graywater Systems	0%	0%	0%
Home Aerobic Unit/Drainfield Systems	0%	1%	4%
Home Aerobic Unit/Borehole	0%	0%	2%

Source: Florida Health and Rehabilitative Services, 1986

As reflected in this survey, conventional septic tanks remain the most common type of OSDS installed in Monroe County. Prior to 1984, the predominant type of OSDS installed in Monroe County was the conventional septic tank with absorption beds. While the use of absorption beds has decreased in recent years, conventional systems using fills or mounds has increased along with alternate home aerobic units which utilize drainfields or injection wells.

When site conditions are favorable and septic tank systems are properly designed, constructed, and maintained, they can be efficient and economical alternatives to centralized wastewater treatment systems. Under unfavorable site conditions, such as high septic tank density, high seasonal rainfall, shallow ground water, or highly permeable soils, OSDS can be a significant source of nutrient and

bacterial ground water contamination. Sherman et al. (1988) indicated that virtually 100 percent of the soils in Monroe County are severely limited for conventional OSDS practices.

According to the provision of 10D-6 F.A.C., maintenance of on-site disposal systems is the responsibility of the person owning or controlling the property on which the on-site disposal system is installed. The minimum recommended time period between maintenance checks is specified as being three years. The Monroe County Land Development Regulations require that inspection affidavits be filed with the Planning Department by licensed contractors or engineers. The requirement is at the present time not being monitored or enforced and as a result mandatory HRS inspections are being proposed.

An additional monitoring requirement adopted by HRS and set forth in the special sections of Chapter 10D-6, Part II, which pertain to only portions of Dade County and all of Monroe County, requires that aerobic on-site disposal facilities be inspected at least three times a year and that the county public health unit monitor a representative sample of these units. At the present time, of the 350 aerobic treatment units for single family homes and commercial establishments treating up to 5,000 GPD permitted by the HRS - Monroe County Public Health Unit, there are approximately 184 aerobic on-site systems operating in unincorporated Monroe County. These aerobic systems can discharge effluent into either a drainfield system similar to what would be used for a septic tank system or through a gravel filter and then into a borehole extending a minimum of 50 feet deep. Of the units installed and operating, 120 are utilizing borehole discharge and 64 utilize drainfields. HRS has recently issued the reporting and monitoring requirements related to these aerobic systems through incorporation of the requirements in Chapter 10D-6, Part II. However, local enforcement of these requirements has not begun. Based on limited sampling conducted by DER from 1987 through 1989, data has indicated that many of these aerobic systems are not functioning in compliance with the National Sanitation Foundation standards which are referenced in Chapter 10D-6 and are utilized as defining the acceptable levels of treatment for aerobic sewage treatment units. Implementation of the adopted HRS monitoring requirements should begin to provide an indication of the appropriateness of future utilization of aerobic on-site disposal systems in the Keys.

Soil identification is probably the most useful information in determining site suitability for onsite wastewater facilities. The U.S. Department of Agriculture Soil Conservation Service (SCS) has prepared Detailed Soil Surveys for many of Florida's counties. These surveys can be useful in planning as they include information on depth to seasonal water table, flood potential, depth of suitable soil material, percolation rates, and limitations for various uses including on-site waste treatment systems. Tables 3.2 and 3.3 in Chapter 3.0 (Conservation and Coastal Management Element) indicate the characteristics of soils found in Monroe County. The limitations found for septic tank use, as recently determined by the SCS are shown in Table 3.4. As shown in these tables, all soils in Monroe County are rated "Severe" for the use of septic tank absorption fields. In October 1987, an HRS-funded research project by Kirkner and Ayres and Associates found that 70.5 percent of Monroe County soils have "very severe" and 29 percent have "severe" limitations for OSDS use.

As reported by DER in the 1988 Wastewater Treatment and Design Manual:

"When able to percolate downward through suitable soils, most pollutants are removed from effluents within relatively short distances. If there is insufficient depth of suitable soil between the drainfield and the groundwater table or an impervious layer, the partially treated effluent

will enter the groundwater system or flow laterally and break out into surface waters or drainage ditches. Pollutants have been found to travel great distances from their source when aided by the flow of groundwater."

The characteristics of septic tank effluent presented in Tables 10.2 and 10.3 indicate the potential for contamination of ground water from septic tank effluent. These contaminants include natural and synthetic organic compounds expressed in terms of BOD₅, COD, TSS, nitrogen, phosphorous, and pathogens.

The performance requirement for Class I individual aerobic waste water treatment units is defined in Section 6 of the National Sanitation Foundation Standard Number 40: "Plants listed for Class I effluent must be shown to meet EPA Secondary Treatment Requirements for BOD₅, SS and pH." These requirements are a 30-day average of 30 mg/l for BOD₅ and SS, and a pH of 6.0 to 10.0. There are no requirements for nutrient reduction (National Sanitation Foundation, 1983).

Table 10.2
Septic Tank Effluent Quality

Constituent	Concentration (mg/l)
BOD	90-348
COD	150-720
TOC	+129
TS	+820
SS (89% 0.5-5.0 micron)	40-350
VSS	80% SS
TN	+25-36
Organic N	30% TN
Ammonia (NH ₄ -N)	70% TN
PO	35-100
Grease	50-150
E. coli	106-108/100 ml

Source: Laak, 1980.

Table 10.3
Typical Effluent Concentrations from Septic Tank Systems

Parameters (mg/l)	Septic Tank Effluent	Drain System Effluent	% Removal in Drain System
Suspended solids	75	18-53	29-76
BOD5	140	28-84	40-80
COD	300	57-142	53-81
Total Nitrogen	40	10-78*	---
Total Phosphorous	15	6-9	40-60

Note: *Reported as ammonia nitrogen.

Source: Canter and Knox, 1985.

Meetings with representatives from HRS and DER concluded that although numerous studies have been conducted relating to OSDS performance, there has been no definitive quantitative conclusions concerning the relationships between septic tank effluent and nearshore water quality degradation. There is, however, reasonable suspicion that nutrient loading from regulated and unregulated OSDS contributes to nearshore water quality degradation. The Stipulated Agreement between Monroe County and the State of Florida Department of Community Affairs requires that standards for OSDS be based on environmental carrying capacity which address nutrient loading and maintains the quality of nearshore waters. These OSDS standards, as well as standards for all wastewater treatment and disposal techniques will be established as a result of the SW/SMMP.

As a starting point in conjunction with preparation of the Monroe County Comprehensive Plan, an inventory of all permitted and unpermitted septic tanks and cesspools has been undertaken. The methodology utilized is to map on one inch equals 200 feet aerial photos (flown 1991) the location of permitted septic tanks and aerobic units. The remaining residential structures, which appear to be inhabited or have the potential to be inhabited, and are not utilizing package treatment or central sewer facilities will be located on the aerial photos and identified as potentially utilizing unregulated on-site disposal systems. In addition, licensed septic tank installers and maintenance personnel will be interviewed in order to ascertain the location of unpermitted septic tanks or cesspools. It is expected that this effort, scheduled for completion concurrent with the adoption of the Comprehensive Plan, when compared with the results of the nearshore water quality monitoring program, will provide the necessary information to more nearly quantify the affects of septic tank/cesspool effluents on nearshore water quality.

10.2.2 Alternative On-Site Disposal Systems

Florida, and specifically Monroe County, has a particularly high percentage of soils unsuited to conventional OSDS septic tank/absorption bed systems. If OSDS are to function properly in such soils, alternative systems which are designed to overcome the specific limitations, improve effluent treatment, and reduce the potential for groundwater contamination must be used. Various alternative types of treatment/disposal beyond the septic tank and drainfield or absorption bed are available for consideration.

A. Aerobic Treatment Units

Aerobic treatment units which utilize soil absorption systems or injection wells are sometimes used in place of conventional septic tanks. Fixed media filters can be used in combination with either septic tanks or aerobic units for providing additional treatment of effluent. The performance requirement for Class I individual aerobic waste water treatment units is defined in Section 6 of the National Sanitation Foundation Standard Number 40 which states that "plants listed for Class I effluent must be shown to meet EPA Secondary Treatment Requirements for BOD₅, SS and pH." These requirements are a 30-day average of 30 mg/l for BOD₅, and SS, and a pH of 6.0 to 9.0. There are no requirements for nutrient reduction (National Sanitation Foundation, 1983).

Special rules which HRS adopted for portions of Dade County and for the Florida Keys (10D-6, Part II), contemplated the need for further monitoring and analysis of the impacts of certain alternate on-site sewage disposal systems. Rule 10D-6.063(2)(d)10, F.A.C., provides that:

The county public health unit shall, at least annually, monitor the maintenance and performance of aerobic treatment units for a determination of the effectiveness of the provisions of paragraph 10D-6.063(2)(d), (Part II) in assuring proper operation, maintenance, performance and utilization of aerobic treatment unit systems.

Similar requirements are found in Rule 10D-6.063(3)(e), F.A.C. Though the complete monitoring and reporting requirements have not been implemented to date by HRS, some limited monitoring data has been generated. Samples were taken in May 1987, August, 1988 and February 1989, and were analyzed by the DER in Marathon. This recent aerobic treatment unit data has suggested that in the Florida Keys, many of these systems are not functioning in compliance with the current National Science Foundation (NSF) standards. The most recent data was obtained from Jet and Multiflow aerobic treatment units installed on Little Torch Key. Some of the units sampled that did not meet these standards were Rotordisk units which have not yet been approved by NSF. Although it is difficult to correlate the limited samples available with the testing methodologies contained in the NSF standard, half of the aerobic units tested in August 1988 exceeded the values for BOD₅, while half of the May 1987 samples did not meet the 85 percent removal criterion for TSS.

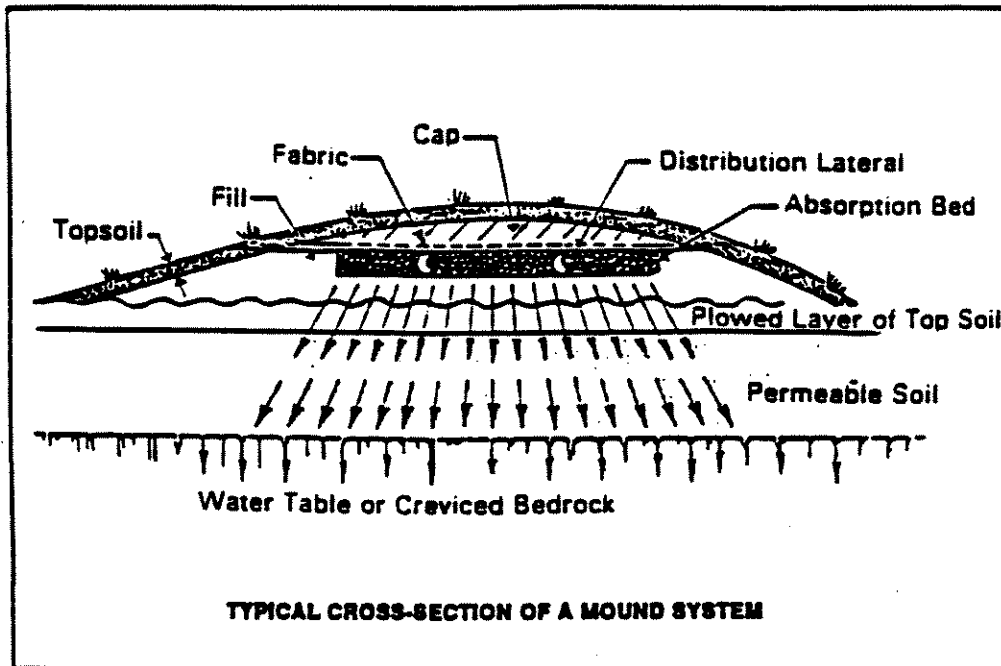
Though alternative OSDS systems have been shown generally to provide improved treatment of sewage relative to conventional septic tanks, further monitoring and evaluation of these systems by HRS is essential to ensure the protection of public health and water quality in the Florida Keys. Additionally, concerns over recent sampling results should not preclude the consideration of other types of alternate and experimental systems. Nitrogen and phosphorous concentrations in wastewater may be reduced through specifically designed systems. Such systems may be utilized for OSDS and package

treatment plants. They must be carefully designed, constructed, operated and maintained to achieve the desired results. They are inherently more sophisticated and require a substantially higher level of care than normally afforded OSDS and small treatment plants. Alternate and experimental OSDS which consider BMP's and best available technologies will be investigated in the initial phase of the SW/SMMP.

B. Mounds

In Florida, the most common alternative to the conventional soil absorption system is the mound system. A properly constructed mound system utilizing good fill material may be more efficient than an equally well constructed conventional system in marginal or unsatisfactory natural subsurface soils. The objective of mound systems is to effectively treat sewage before it reaches ground or surface waters. This is done essentially by raising the absorption field above natural soils and increasing the distance between the water table and the drainfield by using suitable fill material. Mounds can be utilized to provide effluent treatment and disposal from a septic tank, aerobic unit, or other treatment unit. Minimum requirements for construction, and criteria for the location of mounds, are contained in Chapter 10D-6, F.A.C. Figure 10.1 is a schematic of a mound system.

Figure 10.1
Typical Cross-Section Of A Mound System



Source: Design Manual: Onsite Wastewater Treatment and Disposal Systems,
EPA, October 1980.

Mound systems have certain advantages related directly to construction practices including:

- (a) percolating effluent leaving a mound enters the more permeable natural upper soil over a large area and can spread laterally until it is absorbed by the less permeable subsoil;
- (b) the clogging zone that eventually develops at the bottom of a drainfield may not clog the sand mound fill to the degree or rapidity it would in naturally very fine textured soils; and
- (c) smearing and compacting, which can occur when excavating wet fine textured subsoils, can be avoided.

It should be pointed out that Florida health officials require excavation and replacement of natural soils when they are not considered suitable for receiving effluent from mound systems. This is partly due to the fact that most Florida systems are not technically mound systems but, in most cases, are elevated drainfields.

C. On-Site Management Systems

Various alternatives for on-site treatment and disposal of wastewater are available for use in Monroe County and will be identified in the SW/SMMP. It is important, however, when choosing an alternative that each component combined to make a total system should meet the following basic criteria (DER Wastewater Management Manual, 1988):

- (a) Produce an effluent of adequate quality for safe disposal;
- (b) Be simple (few mechanical parts; easy to maintain);
- (c) Be reliable (maintain consistent treatment);
- (d) Protect the aesthetic qualities of an area; and
- (e) Be acceptable to the homeowner or to the owner of another type of establishment (easy to use; creates no nuisance).

The term Best Management Practice (BMP) means a practice or combination of practices that are determined to be the most effective, practical means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. The selection of an appropriate BMP will depend greatly upon site conditions such as land use, topography, slope, water table elevation, and geology. BMP selection must be very site specific so as to assure proper BMP operation and prevent undesirable results such as protection of surface waters but contamination of ground water.

A successful on-site system produces an effluent which is compatible with the environment to which it is discharged. However, improper siting, installation or maintenance can lead to degradation of surface or ground waters. Two documents prepared by the DER - Septic Tank Nonpoint Source Element (June 1979) and Chapter 7 of the Florida Development Manual - contain extensive discussions on the proper use, design, construction, and maintenance of on-site wastewater systems. The first document was

prepared in cooperation with the Technical Advisory Committee on Septic Tanks whose membership included representatives from the HRS, county health departments, the septic tank industry, the Soil Conservation Service, and the Florida Home Builders Association. These documents are considered as the BMP manuals for on-site wastewater management.

Some of the BMP's suggested to minimize nonpoint source impacts from on-site wastewater systems include:

- (a) Since treatment is provided primarily by the soil matrix, sound site planning is essential. Careful evaluation of a site's soils, geology, topography, water table levels, hydrology, location of trees and vegetation and setback requirements must be undertaken to assure proper levels of treatment.
- (b) User education programs are vital since on-site systems are "out of sight, out of mind." It is important that users understand how the system works and how everyday activities can cause problems and reduce treatment efficiency.
- (c) Maintenance programs are essential since a septic tank can become too filled with solids, causing poor settling and the transfer of solids into the absorption system causing cloggings and system failure.
- (d) Alternative treatment and disposal systems such as aerobic units, granular media filters, and mound systems are especially applicable on sites with improper soil, water table, or geologic conditions. These alternative systems can provide a higher level of treatment than conventional systems.

10.2.3 Centralized Systems

The most common type of centralized sanitary sewer system is the localized small sewage treatment facility, or "package plant" as they are commonly known. Large scale municipal sanitary sewer systems which generally provide services to densely populated areas are another type of centralized facility. These centralized facilities are comprised of three components which perform the basic functions of collection, treatment and disposal of sewage.

A. Collection

The collection system is composed of a network of sewer pipes which collect sewage (also called wastewater) from individual establishments and convey it to a central location for treatment. The collection network is generally laid out in a pattern roughly analogous to the branching pattern of a tree. This classification scheme identifies sewers according to their location within the network. Since sewage flow within the network is from the periphery toward the treatment plant, this scheme allows for easy identification of components.

Interceptors are defined as sewers which connect directly to and convey sewage to the treatment plant. Trunk mains are defined as sewers which connect directly to and convey to an interceptor.

Wastewater collection systems utilize the force of gravity to the extent possible to convey sewage. Gravity systems work best in hilly terrain. In level terrain, a pumping system conveys sewage under pressure. The term "force main" is often applied to pressurized sewers without regard to their location within the network.

B. Treatment

The treatment plant component of the central sanitary sewer facility functions to remove solid and organic materials from the sewage. Depending on the proportion of materials removed, processes which accomplish treatment are generally grouped into one of the following four categories.

Primary Treatment

Primary treatment removes between 30 and 35 percent of the organic materials and up to 50 percent of the solids from the sewage, and is the least expensive treatment. This level of treatment is also commonly referred to as physical treatment because screens and settling tanks are the most common methods used to remove the solids.

Secondary Treatment

Secondary treatment removes between approximately 90 percent of total organic materials and suspended solids from sewage, and is the most common level of treatment provided by centralized facilities. This level of treatment generally requires multiple steps involving one biological process and one or more processes for removal of suspended solids, and is more expensive than primary treatment.

Tertiary Treatment

Sewage may also contain large quantities of synthetic organic compounds or inorganic chemicals which may create pollution problems if not removed. Tertiary treatment is any treatment process beyond secondary treatment. The most common tertiary processes remove compounds of phosphorous and nitrogen. One method of tertiary treatment is spray irrigation, such as the irrigation of the golf course at Key Colony Beach. Because of the extra processes required tertiary treatment is more expensive than secondary treatment.

Advanced Wastewater Treatment

This term refers to tertiary treatment within the wastewater treatment plant itself to levels of water purity generally acceptable for discharge directly into surface waters. Advanced Wastewater Treatment (AWT) standards are set by law (s. 403.086 F.S.) in Florida. While AWT standards are very stringent, achieving this level of treatment gives a utility certain legal rights to discharge directly into surface waters. Currently, less than .05 percent of the wastewater treatment facilities in the State of Florida meet the AWT treatment standards. Advanced waste treatment is the most expensive method of treatment due to the additional plant and operations costs.

C. Disposal

Effluent is the treated wastewater which flows out of the treatment plant and disposal alternatives include discharge to a water body, discharge to the surficial aquifer through percolation ponds, bore holes, irrigation reuse or injection into deep aquifers. Proper effluent disposal is essential to protect surface and ground waters from environmental degradation. Class V injection wells are the prevailing sewage disposal method in the County for centralized systems such as package plants. As reported by

the DER in January, 1988, the secondarily treated effluent being disposed of via these injection wells in the Florida Keys is of relatively good quality for disposal into Class G-III groundwater. Though additional monitoring of injection wells by DER is scheduled, no violations of the "minimum criteria" for groundwater were found in 20 effluent samples collected by the DER in 1988. Further, localized data collected by the DER Marathon district office have shown that effluent disposed of in cased wells will have less effect on surface waters than effluent disposed of in drainfields.

On November 12, 1975, Monroe County adopted the following resolutions concerning wastewater treatment in the unincorporated County:

"Monroe County or the developer will provide for adequate wastewater treatment in existing and new development.

"Centralized public treatment facilities will be developed in urbanized areas as economic feasibility is evidenced. The Plan (Land Use Plan Update) will require phasing out of septic tanks and package treatment plants, with hook-ups to these new treatment plants as they become available.

"In new residential subdivisions where planned densities are sufficient to eventually support a central treatment facility, the use of septic tanks will be permitted only on an interim basis until sufficient development has occurred to permit the installation of the central treatment system by the developer. New developments will be required to strictly conform to County and State design and operating standards for septic tanks and package treatment plants. Development in which private central treatment facilities will be required will be responsible for providing collection, treatment, and disposal methods that meet design and performance standards established by the County. New development in areas where public central treatment is available will be required to provide collection lines at the developer's expense."

In recognition of this possible solution and in anticipation of future population growth in unincorporated areas of the Florida Keys, the Monroe County 201 Facilities Plan (CH2M Hill, 1979) was developed for the DER to design centralized wastewater collection, treatment, and disposal facilities throughout the County. The Plan, however, was only to be implemented following completion of a water quality monitoring program that confirmed the need for site-specific centralized facilities by documenting consistent violation of State water quality standards in specific areas of the Florida Keys.

In addition, interim and long-range planning regarding selection of treatment process (whether OSDS or treatment plants), location or system type (OSDS, cluster systems, or central systems) should be based on the larger picture and overall benefits to the community and not on a site by site individual basis, as is currently the case. Handling wastewater from commercial and industrial establishments presents special problems which should be incorporated into the overall community planning process. Further, technology changes and population growth patterns indicate a need for flexibility in planning and the ability to retrofit existing and future OSDS when desirable.

The use of alternative sewer systems such as low-pressure grinder pumps (GP) and septic tank effluent pumps (STEP), small diameter gravity sewers, and vacuum sewer systems offer the flexibility and lower cost advantages which will be evaluated during development of the SW/SMMP.

There are 277 permitted package treatment plants operating in Monroe County of which 193 are in the unincorporated County. The location of the package treatment plants in the unincorporated county are shown on the Sanitary Sewer Map series of the Map Atlas. The treatment process utilized by the plants is a biological process which depends on providing a satisfactory habitat for biological organisms. These biological organisms are most commonly bacteria but may also include fungi, ciliates, rotifers and nematode worms. The most common process utilized is the activated sludge treatment process which provides the resident biological organisms with an environment in which they can digest the organic materials contained in the effluent. There are numerous modifications of the activated sludge process such as conventional, step aeration, and contact stabilization. The primary process utilized by the package treatment plants is the extended aeration process which provides an aeration detention time of at least 24 hours.

Package treatment plants are regulated by the provisions of Chapter 17-600 F.A.C., Domestic Wastewater Facilities, by the State of Florida Department of Environmental Regulations which provide minimum design waste treatment and disinfection standards. Wastewater treatment plants permitted for construction after January 1, 1982 and plants existing prior to January 1, 1982, which have had modifications which require compliance with the reclaimed water or effluent limitations required by 17-600 F.A.C. must be operated and maintained so as to attain at a minimum, the reclaimed water or effluent quality required by Rules 17-600.440 and 17-600.740(1) F.A.C. Treatment Plants existing prior to January 1, 1982, must at a minimum, meet reclaimed water or effluent limitations as specified in the facilities permit. All package treatment plants are required to provide secondary treatment of wastewater. All new domestic facilities and modifications to existing facilities are required at a minimum to be designed to achieve an effluent, after disinfection, containing not more than 20 mg/l BOD and 20 mg/l TSS, or 90 percent removal of each of the pollutants from the wastewater effluent, whichever is more stringent. An inventory of permitted package treatment plants operating in unincorporated Monroe County and the plants' design capacity, performance, and the level of biochemical oxygen demand and the total suspended solids in the effluent is presented in Table 10.4.

Due to the Outstanding Florida Waters designation in Monroe County, it is very difficult to obtain a new permit from the Department of Environmental Regulation and Environmental Protection Agency to construct an outfall to surface waters as a method of effluent disposal. There are currently six (6) wastewater treatment facilities discharging effluent via outfall to surface waters in unincorporated Monroe County (see Table 10.5).

TABLE 10 - 4
SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

SITE NAME	MAP REF #	M.M.	SITE LOCATION	KEY	SERVICE POP.	DESIGN CAP. (TGD)	AVERAGE PEAK DAILY FLOW (MGD)	% OF DESIGN CAPACITY	AVERAGE ONTHLY FLOW (MGD)	% OF DESIGN CAPACITY	RESPONSIBLE ENTITY		BOD / TSS
											PHONE		
Oceanside Marina	1	4.0	Maloney Avenue	Stock Island	100	20.0	0.00739	36.95%	0.00614	30.70%	Joe Davis		6.8 / 5.1
Roy's Mobile Home Park	3	4.5	Maloney Avenue	Stock Island	240	12.5	0.01650	132.00%	0.01386	110.88%	(305)294-9578	William Harvelle	7.8 / 8.0
Coconut Grove Mobile Home Park	4	5.0	Maloney Avenue	Stock Island		6.0	N.R.	0.00%	0.00400	66.67%	(305)296-2624	Marietta Kaszyk	13.0 / 7.7
Harbor Shores Mobile Home Park	5	5.0	600 Maloney Avenue	Stock Island	100	15.0	0.00807	53.80%	0.00621	41.40%	(305)296-6621	Roy Shaw	9.0 / 8.8
Key Haven Utilities	6	5.0	Key Haven Road	Raccoon	1100	100.0	0.14610	146.10%	0.10057	100.57%	(305)294-6763	Wayne Lujan	10.9 / 10.1
USNAS (Boca Chica Field)	7	8.0	Naval Air Station	Boca Chica	2577	400.0	0.30379	75.95%	0.13090	32.73%	Capt. John Ensch		4.6 / 5.1
Seaside Resorts, Inc.	8	10.5	55 Boca Chica Road	Big Coppitt		40.0	0.01225	30.63%	0.01220	30.50%	(305)296-3561	Philip R. Dobert	9.4 / 7.7
Geiger Key Marina	9	11.0	S.R. 941	Geiger	50	5.0	0.00558	111.60%	0.00207	41.40%	Frank Coon		10.4 / 7.1
Lazy Lakes Campground	10	15.5	Johnson Road	Sugar Loaf	138	10.0	0.00664	66.47%	0.00400	40.04%	(305)296-3141	Bruce Bryant	7.7 / 5.2
Sugarloaf Lodge	11	18.0	US 1 @ Mile Marker 18	Sugar Loaf		18.0	0.00854	47.44%	0.00346	19.22%	(713)459-3613	Lloyd Good	11.4 / 3.0
Sugarloaf Elementary School	12	19.5	Crane Boulevard	Sugar Loaf	360	7.5	0.00481	64.13%	0.00264	35.20%	A.J. Henriquez		10.4 / 8.1
Sugarloaf K.O.A.	13	19.9	Route 2	Sugar Loaf		25.0	0.01672	66.88%	0.01129	45.16%	(305)296-6523	Ron Glenn	8.6 / 8.4
The Gullery Restaurant	14	25.0	82779 Overseas Highway	Sugar Loaf	80	4.0	0.00375	93.75%	0.00217	54.25%	(305)743-9071	Douglas Prew	0.3 / 0.9

TABLE 10 - 4
SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

SITE NAME	MAP REF #	M.M.	SITE LOCATION	KEY	SERVICE POP.	DESIGN CAP. (MGD)	AVERAGE PEAK DAILY FLOW (MGD)	% OF DESIGN CAPACITY	AVERAGE ONTHL FLOW (MGD)	% OF DESIGN CAPACITY	RESPONSIBLE ENTITY PHONE	BOD / TSS
Venture Out @ Cudjoe Key	15	25.0	Route 2 Box 38	Summerland	2000	70.0	0.04700	67.14%	0.03271	46.73%	(305)451-2331 Don Peterson	4.0 / 8.0
Looe Key Reef Resort	16	27.0	M.M. 27 Overseas Highway	Ramrod		10.0	0.00640	64.00%	0.00600	60.00%	Joseph Glenn (305)872-2215	5.0 / 2.4
Breezy Pine Trailer Park	17	29.8	US 1 @ Mile Marker 29.8	Big Pine	148	7.5	0.00350	46.67%	0.00312	41.60%	W. Oblander	8.6 / 8.2
Big Pine Plaza Shopping Ctr.	18	30.5	S.R. 940 & Wilder Road	Big Pine		20.0	0.00920	46.00%	0.00614	30.70%	New Guarantee Fed. Sav.	9.4 / 3.4
Big Pine Motel	19	30.7	Overseas Highway	Big Pine	50	5.0	0.00472	94.40%	0.00386	77.20%	Jesse Perkins (512)494-3917	6.1 / 5.9
Big Pine Key Road Prison	20	32.0	P.O. Box 509	Big Pine	70	10.0	0.00990	99.00%	0.00707	70.71%	L.L. Mainwright	7.0 / 8.5
Bahia Honda #3	21	36.5	US 1 @ Mile Marker 36.5	Bahia Honda		5.0	0.00550	110.00%	0.00400	80.00%	John Sommers (904)487-1657	9.3 / 4.5
Bahia Honda #4	22	36.5	US 1 @ Mile Marker 37	Bahia Honda		8.3	0.00175	21.08%	0.00100	12.05%	Michael Farmer (904)487-0999	7.8 / 13.2
Bahia Honda #2	23	37.0	US 1 @ Mile Marker 37	Bahia Honda		3.3	0.00250	75.76%	0.00200	60.61%	Florida D.N.R. (904)487-0999	9.5 / 8.3
Sunshine Key Travel Park	24	39.0	Route 1 Box 790	Ohio	600	60.0	0.06929	115.48%	0.04236	70.60%	Capital Insurance Mgmt.	8.4 / 7.8
Hank's Nest Condo	25	47.0	1 Kyle Way	Marathon	100	7.5	0.00443	59.07%	0.00443	59.07%	John Hickin	3.1 / 14.6
Quay Restaurant	26	47.5	12650 Overseas Highway	Marathon		15.0	0.00566	37.73%	0.00407	27.13%	Steve Skropolis	11.7 / 16.9

TABLE 10 - 4
SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

SITE NAME	MAP REF. #	M.M.	SITE LOCATION	KEY	SERVICE POP.	DESIGN CAP. (TGD)	AVERAGE PEAK DAILY FLOW (MGD)	% OF DESIGN CAPACITY	AVERAGE ONTHL. FLOW (MGD)	% OF DESIGN CAPACITY	RESPONSIBLE ENTITY PHONE	BOD / TSS
Galway Bay Mobile Home Park	27	47.5	1361 Overseas Highway	Marathon	150	20.0	0.04758	237.90%	0.03115	155.75%	Helen McDonough	8.9 / 30.9
Boat Key Marina	28	47.7	1996 Overseas Highway	Marathon	225	40.0	0.01031	25.77%	0.00614	15.35%	Jerold Miles (714)476-8180	4.3 / 13.3
Pelican Restaurant	29	47.5	1490 Overseas Highway	Marathon	150	7.5	0.00405	54.00%	0.00164	21.87%	Rip Tosun (305)664-5300	
Pard Blanco Resort	30	48.0	1996 Overseas Highway	Marathon		10.0	0.00659	65.90%	0.00393	39.30%	Jim Kelsey (305)743-9012	4.7 / 3.1
S. Switlik Elementary Sch.	31	49.0	3400 Overseas Highway	Marathon	642	15.0	0.00637	42.47%	0.00286	19.07%	A.J. Henriquez	3.1 / 6.8
Hurricane Motor Lodge	32	48.6	4650 Overseas Highway	Marathon	70	8.0	0.01133	141.63%	0.00808	101.00%	Y. Litrell	8.4 / 6.1
Casa Cayo Condo	33	49.0	1500 Overseas Highway	Marathon		3.2	0.00281	87.81%	0.00143	44.69%	C.H.S. Corporation (305)743-6565	0.3 / 0.6
Coral Lagoon Resort	34	48.8	12399 Overseas Highway	Marathon	150	8.8	0.00391	44.43%	0.00321	36.48%	Richard Gross (305)289-0121	1.2 / 0.9
Fisherman's Hospital	35	49.1	3301 Overseas Highway	Marathon	150	21.0	0.00618	29.43%	0.00457	21.76%	Joseph Suiter (305)743-5533	3.0 / 7.8
Lady Alexander Condo	36	49.0	1505 Sombrero Beach Road	Marathon	50	5.0	0.00100	20.00%	0.00100	20.00%	Mildred Stengel	0.4 / 4.7
Marathon High School	37	49.7	Sombrero Beach Road	Marathon		15.0	0.00730	48.67%	0.00286	19.07%	Armando Henriquez (305)296-6523	5.0 / 5.6
Mid-Town Trailer Park	38	48.9	37th Street	Marathon	46	7.5	0.00586	78.13%	0.00286	38.13%	Joseph Hendrickson (305)743-9379	8.7 / 13.3
Monroe County Housing Authority	39	49.1	240 Sombrero Boulevard	Marathon	616	60.0	N.R.	0.00%	0.00833	13.88%	Harry Haskins	7.9 / 4.0

TABLE 10 - 4
SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

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Schooner Condo's	40	49.3	605 Sombra Boulevard	Marathon	20	5.0	0.00353	70.60%	0.00257	51.40%	(305)296-5621 Paul Kenson	1.0 / 5.6
Spanish Galleon Condo	41	49.5	1115 Sombra Boulevard	Marathon	50	5.0	0.00472	94.40%	0.00300	60.00%	(305)743-3585 Luther Koehler	2.0 / 4.0
Tradewind West Condo	42	49.3	5301 Ocean Terrace	Marathon	28	6.4	0.00193	30.16%	0.00164	25.62%	(305)743-5104 Leo Basshand	1.6 / 16.6
Buccancer Lodge	43	49.5	2600 Overseas Highway	Marathon	230	30.0	0.01164	38.80%	0.00621	20.70%	(305)743-0256 John Adams	5.8 / 3.3
Cobia Point Condo	44	48.9	1515 Sombra Boulevard	Marathon	32	5.0	0.00634	126.80%	0.00329	65.80%	(305)743-9071 Tom Murphy	4.0 / 5.6
Marathon Key Beach Club	45	49.8	4590 Overseas Highway	Marathon	216	30.0	0.01950	65.00%	0.01214	40.47%	(305)367-2393 elbourne Rappaport Capt	4.8 / 5.7
Sombra Beach Village Util.	46	49.5	5 Man O'War Drive	Marathon	35	5.0	0.00179	35.80%	0.00179	35.80%	(305)458-8006 Joe Hopps	0.3 / 2.8
Days Inn	47	50.1	13201 Overseas Highway	Marathon	268	35.0	0.03784	108.11%	0.02341	66.89%	(305)743-9265 Donna Johnson	5.1 / 10.7
Gulfside Village Shopping Ctr	48	50.2	5800 Overseas Highway	Marathon		8.0	0.00410	51.25%	0.00214	26.75%	(305)269-0222 Gulfside Vill Condo Assoc	6.3 / 15.8
Harbor Club South Condo Assoc	49	49.5	423 Sombra Beach Road	Marathon	70	10.0	0.00114	11.40%	0.00114	11.40%	(305)743-0118 Roberta Williamson	1.1 / 2.4
Harbor House Condo	50	49.1	1217 Sombra Boulevard	Marathon	72	5.0	0.00129	25.80%	0.00129	25.80%	(305)743-0811 Tom Morris	1.2 / 6.4
International House of Pancake	51	50.1	6495 Overseas Highway	Marathon		4.7	0.00293	62.23%	0.00175	37.23%	FMS Management Sys. Inc. (305)931-5454	1.5 / 3.0

TABLE 10 - 4
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Island Club Condo	52	50.1	9 Sombbrero Boulevard	Marathon	60	8.0	0.00289	36.13%	0.00143	17.88%	Fred Bohmker (305)743-4589	4.7 / 6.0
Key Lime Condo (Resort)	53	50.2	11600 - 1st Avenue	Marathon		60.0	0.01679	27.98%	0.01121	18.68%	Jim Simons (305)743-3505	5.4 / 10.1
Marathon Country Club Condo	54	50.0	15 Sombbrero Boulevard	Marathon		8.0	0.00257	32.13%	0.00257	32.13%	Millford Tesner	1.0 / 11.8
Sombbrero Resort	55	49.9	19 Sombbrero Boulevard	Marathon	100	20.0	0.01556	77.80%	0.00879	43.95%	Victor Demaras (305)743-3585	4.9 / 6.6
Sombbrero Ridge Condo	56	49.6	303 Sombbrero Boulevard	Marathon	48	4.8	0.00157	32.71%	0.00157	32.71%	Jack Zito	0.9 / 1.6
K-Mart Shopping Center	57	50.2	5561 Overseas Highway	Marathon	150	15.0	0.01297	86.47%	0.00764	50.93%	C/O Isnaid Plaza Mgmt.	9.0 / 8.9
Lucy Apartments	58	50.6	489 - 63rd Street	Marathon	20	3.0	0.00187	62.33%	0.00107	35.67%	Thomas Wright (305)743-6565	1.4 / 5.3
The Reef at Marathon	59	50.6	6800 Overseas Highway	Marathon	144	17.0	0.01205	70.88%	0.00621	36.53%	Lamar Liddle (305)743-6561	7.5 / 5.5
Captain's Quarters Condo	60	51.0	2275 Anglers Drive	Marathon		3.0	0.00268	89.33%	0.00050	16.67%	Earl Jaack (305)743-5969	2.4 / 1.9
Coral Club Condo	61	50.8	389 Anglers Drive	Marathon	40	5.0	0.00236	47.20%	0.00179	35.80%	G.O. Boston (305)743-3513	0.3 / 5.6
Howard Johnson's	62	50.9	US 1	Marathon		25.0	0.03609	144.36%	0.01836	73.44%	R.B. Howard (305)422-4070	7.2 / 10.6
Key RV Park	63	51.0	6099 Overseas Highway	Marathon	256	15.0	0.00614	40.93%	0.00614	40.93%	A.T. Parson, Jr. (904)737-1245	3.9 / 15.0
Marathon Manor Nursing Home	64	49.7	320 Sombbrero Beach Road	Marathon	120	15.0	0.01182	78.80%	0.00771	51.40%	Beverly Enterprises, Inc.	24.6 / 55.7

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Hank's Cay Resort	77	61.0	US 1, Utility Island	Duck	2000	50.0	0.06165	123.30%	0.04536	90.72%	Donald Johnson (305)785-4555	5.2 / 3.6
Long Key Ocean Bay Condo	78	65.5	P.O. Box 403	Long	30	7.0	0.00350	50.00%	0.00107	15.29%	(305)664-8106	8.0 / 5.0
Outdoor Resort's @ Long Key	79	65.5	US 1 @ Mile Marker 65.5	Long		60.0	0.04873	81.22%	0.02893	48.22%	Fred Diehl (305)664-4860	8.7 / 6.3
Long Key State Park #1	80	67.5	P.O. Box 776	Long	60	2.6	0.00234	90.00%	0.00083	31.92%	Ney Landrum	1.1 / 1.4
Long Key State Park #2	81	67.6	P.O. Box 776	Long	60	2.6	0.00240	92.31%	0.00100	38.46%	Ney Landrum	0.3 / 5.6
Long Key State Park #3	82	67.6	P.O. Box 776	Long	60	2.6	0.00248	95.38%	0.00100	38.46%	Ney Landrum	0.4 / 3.6
Picosta Key KOA	83	70.0	US 1 @ Mile Post 70	Fiesta	800	46.0	0.05596	121.65%	0.03079	66.93%	Charles Harris (305)664-4922	10.0 / 10.5
Kingsail Resort	84	70.0	7050 Overseas Highway	Marathon		3.3	0.00299	90.61%	0.00171	51.82%	John Divine (305)743-6839	1.4 / 6.2
Caloosa Cove Marina	85	73.1	Route 1, Box 84M	Islamorada	250	25.0	0.00796	31.84%	0.00443	17.72%	Herman Hixon (305)664-8798	1.4 / 5.4
Sandy Point Condo	86	74.5	108 Costa Brava Drive	L. Matecumbe		3.3	0.00096	29.09%	0.00007	2.12%	E.S. Corbett III (305)377-8931	1.0 / 4.8
Papa Joe's Restaurant	87	79.7	US 1, Mile Marker 79.7	L. Matecumbe	200	10.0	0.00492	49.20%	0.00277	27.70%	Patricia Gehrkens (305)644-8756	1.7 / 3.9
Matecumbe Resort (Indian Key)	88	76.5	76261 Overseas Highway	L. Matecumbe		10.0	0.00869	86.90%	0.00350	35.00%	Tammy Macomber (305)644-8801	8.5 / 5.4
Aultman Construction Co.	89	68.0	6799 Overseas Highway	Marathon		0.8	0.00071	94.67%	0.00058	77.33%	James Altman	7.4 / 6.5

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											PHONE		
Ocean 80	90	80.1	US 1, Mile Marker 80	Islamorada	250	25.0	0.02731	109.24%	0.01393	55.72%	(305)745-5984		9.3 / 9.3
The Palms of Islamorada	91	80.4	79901 Overseas Highway	Islamorada	300	20.0	0.00875	43.75%	0.00542	27.10%	(305)644-8861		1.4 / 5.0
Sea Gulls Condo	92	79.9	100 Wrenn Street	Plantation		17.5	0.00944	53.94%	0.00850	48.57%	(305)644-9647		1.3 / 9.2
Breezy Palm Resort Motel	93	80.1	US 1, Mile Marker 80.1	Islamorada	150	15.0	0.01190	79.33%	0.00614	40.93%	(305)852-8018		3.1 / 10.5
La Siesta Resort	94	80.2	US 1	Islamorada		12.5	0.00562	44.96%	0.00246	19.68%	(305)664-2361		1.3 / 4.1
Fisherman's Kettle Restaurant	95	80.9	Route 1, Box 110B	Islamorada	150	15.0	0.00085	5.67%	0.00055	3.67%	(305)664-2132		7.6 / 6.1
Bay Colony Villas	97	81.5	US Highway 1	L. Matecumbe	50	6.0	0.00122	20.33%	0.00054	9.00%	(305)664-4887		0.4 / 1.2
Woody's Lounge	98	81.9	US 1 @ Mile Marker 81.9	Islamorada	33	3.3	0.00269	81.52%	0.00114	34.55%	(803)288-8706		
Cheeca Lodge	99	82.1	US 1 @ Mile Marker 81	Islamorada	130	30.0	0.03486	116.20%	0.02285	76.17%	(305)843-2535		1.8 / 5.1
Pelican Palm Trailer Park	100	82.9	P.O. Box 1262	Islamorada	75	7.5	0.00362	48.27%	0.00208	27.73%	Olivia Shelley		2.1 / 6.3
Caribbean Sunset Inn	101	82.4	P.O. Box 269	Islamorada	200	30.0	0.00765	25.50%	0.00369	12.30%	(305)644-2633		
Lorelei Restaurant	102	82.1	Madiera Road	Islamorada	70	7.5	0.00704	93.87%	0.00429	57.20%	Richard Zie		
											(305)664-4632		1.9 / 7.2
											D. Hawley		
											(305)661-8019		

TABLE 10 - 4
SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

SITE NAME	MAP REF #	M.M.	SITE LOCATION	KEY	SERVICE POP.	DESIGN CAP. (TGD)	AVERAGE PEAK DAILY FLOW (MGD)	% OF DESIGN CAPACITY	AVERAGE ONTHL FLOW (MGD)	% OF DESIGN CAPACITY	RESPONSIBLE ENTITY PHONE	BOD / TSS
Perry's Inn	103	82.5	82749 Overseas Highway	Islamorada		5.0	0.00562	112.40%	0.00269	53.80%	Hans Restuccia (305)664-3681	7.2 / 6.4
Beacon Reef Condo	104	83.1	83201 Old Highway	Islamorada		25.0	0.00836	33.44%	0.00507	20.28%	John Ritchie	2.0 / 5.4
Coral Grill Restaurant	105	83.5	US 1, Mile Marker 83.5	Islamorada		18.0	0.00681	37.83%	0.00408	22.67%	Pieretti Livio	1.4 / 5.7
Chesapeake Motel of Whale Harb	106	83.6	P.O. Box 909	Islamorada	84	7.5	0.00482	64.27%	0.00271	36.13%	(305)664-4803 Christopher Sandry	1.6 / 4.2
Howard Johnson's	107	84.2	US 1 @ Mile Marker 84.2	Islamorada	200	20.0	0.01262	63.10%	0.00631	31.55%	(305)664-4662 Joseph Roth	1.3 / 3.4
Holiday Isle Resort	108	84.2	US 1 @ Mile Marker 84.5	Windley	360	40.0	0.02642	66.05%	0.01358	33.95%	(305)664-2321 Holiday Inn Resort/Marina	1.5 / 3.7
Pelican Cove Resort	109	84.4	84457 Overseas Highway	Windley	40	7.5	0.00754	100.53%	0.00377	50.27%	(305)664-2321 Cathy Salvatory	1.8 / 5.9
B.C.'s Sand Bar	110	85.5	US 1, Mile Marker 85.5	Windley		10.0	0.00200	20.00%	0.00131	13.10%	(305)664-4435 B.C. Sandbar Inc.	2.3 / 4.1
Erik's Floating Restaurant	111	85.5	US 1, Mile Marker 85.5	Islamorada	180	15.0	0.00168	11.20%	0.00079	5.27%	(305)664-4929 Frank Froemling	0.8 / 1.9
Windley Key Trailer Park	112	85.5	84961 Overseas Highway	Windley	86	7.5	0.00258	34.40%	0.00146	19.47%	B.M. Vukovich (305)730-2000	1.3 / 3.2
USCG Station	113	85.7	183 Palermo Drive	Islamorada	36	5.0	0.00157	71.40%	0.00186	37.20%	Civil Engineering Unit (305)536-5661	1.4 / 3.2
Plantation by the Sea	114	87.0	Old S.R. 4A	Plantation		20.0	0.00829	41.45%	0.00557	27.85%	Bob Blandford	1.6 / 3.0
Plantation Yacht Harbor Resort	115	87.0	Over Seas Highway	Islamorada	382	35.0	0.00843	24.09%	0.00464	13.26%	Joseph R. Oulter	1.3 / 2.2

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SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

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											PHONE				
														PHONE	
										(305)852-2381					
Sea Breeze Trailer Park	116	87.2	US 1, Mile Marker 87.2	Islamorada	50	7.5	0.00365	48.67%	0.00223	29.73%		Angel Ham Sixto	3.9 / 28.2		
											(305)667-8265				
Executive Bay Club	117	87.0	US 1, Mile Marker 87	Islamorada	400	50.0	0.01725	34.50%	0.01075	21.50%		Mike Cannon	1.9 / 3.9		
											(305)852-3246				
Consti Harbor Club	118		Old State Road	Islamorada		15.0	0.00825	55.00%	0.00500	33.33%		Le Harris	1.2 / 5.7		
											(305)852-3246				
Putura Yacht Club	119		88540 Overseas Highway	Tavernier		20.0	0.01589	79.45%	0.01414	70.70%		Peter Robustelli	1.6 / 5.3		
											(305)694-4577				
Mariner's Hospital	120		50 High Point Road	Tavernier		40.0	0.03207	80.18%	0.03007	75.18%		Keys Hospital Foundation	2.0 / 2.7		
Summer Sea Condo	121	88.5	88500 Overseas Highway	Tavernier	344	26.0	0.02130	81.92%	0.01886	72.54%		Gail Jules	1.3 / 3.5		
											(305)852-9559				
Plantation Key Governmental Co.	122		2 High Point Road	Tavernier		10.0	0.00725	72.50%	0.00657	65.70%		Monroe County B.C.C.	1.2 / 3.8		
											(305)852-2381				
Coral Shores High School	123	90.0	US 1, Mile Marker 90	Tavernier		15.0	0.00813	54.20%	0.00729	48.60%		A. Henriquez	1.8 / 3.4		
Sunset Acres Mobile Home Park	124		US 1	Tavernier		15.0	0.00804	53.60%	0.00736	49.07%		Marvin Rhodes	1.6 / 5.6		
Plantation Key Elementary School	125		100 Lake Street	Tavernier		20.0	0.00296	14.80%	0.00257	12.85%		A. Henriquez	1.1 / 2.1		
Turek Enterprise Inc.	126		US 1 Mile Marker 90.5	Tavernier		5.0	0.00248	49.60%	0.00200	40.00%		Casimer Turek	0.5 / 2.0		
											(305)852-9717				
Tavernier Towne Shopping Ctr.	127		US 1 at Ocean Blvd.	Tavernier		50.0	0.03921	78.42%	0.03657	73.14%		For Trust 201	1.8 / 2.4		
											(305)373-0220				

TABLE 10 - 4
SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

SITE NAME	MAP REF	M.M.	SITE LOCATION	KEY	SERVICE POP.	DESIGN CAP. (MGD)	AVERAGE PEAK DAILY FLOW (MGD)	% OF DESIGN CAPACITY	AVERAGE ONTHLY FLOW (MGD)	% OF DESIGN CAPACITY	RESPONSIBLE ENTITY PHONE	BOD / TSS
Harbor 92 Condo	128		200 Harbor Drive	Tavernier	158	10.0	0.00654	65.40%	0.00607	60.70%	C. Stoner (305)853-3759	1.3 / 6.8
Silver Shore M.H.P.	129	96.0	US 1 Ocean Side	Key Largo		83.0	0.06586	79.35%	0.06350	76.51%	Eunice Schroeder (305)852-5859	1.6 / 5.8
Driftwood Travel Trailer Park	130		East of US 1	Tavernier		5.0	0.00247	49.40%	0.00193	38.60%	Gail Crawford	0.6 / 0.6
Anchor Condo	131	92.0	US 1, Mile Marker 92	Tavernier	108	9.0	0.00509	56.56%	0.00493	54.78%	Fred Bello (305)852-3478	2.0 / 4.8
Blue Water Trailer Park	132		Burton Drive	Tavernier		45.0	0.03257	72.38%	0.02986	66.36%	Morton Feit (305)852-8823	1.2 / 2.6
Chico Commercial Building	133		Box 94 - Route 1	Tavernier		2.4	0.00141	58.75%	0.00100	41.67%	Pedro Chico (305)852-9663	0.4 / 0.6
Sunset Hammock Condo	134		US 1	Key Largo	200	20.0	0.01414	70.70%	0.01214	60.70%	Jack Murry (305)294-5113	1.3 / 5.0
Key Largo Ocean Resort	135		94825 Overseas Highway	Key Largo	1000	70.0	0.05151	73.59%	0.04936	70.51%	Key Largo Ocean Resort (305)852-3001	1.6 / 8.2
Buttonwood Bay Condo	136		96000 Overseas Hwy, US	Key Largo		90.0	0.03279	36.43%	0.02557	28.41%	Kelly Bennett	1.6 / 7.7
The Sheraton	137	96.8	US 1	Key Largo		80.0	0.06721	84.01%	0.06457	80.71%	KLR Investments, Ltd. (305)825-9529	1.9 / 4.3
Key Largo Yacht & Tennis Club	138	97.5	97501 Overseas Highway	Key Largo	360	10.0	0.00336	33.60%	0.00254	25.40%	Francisco Ondarza	2.2 / 4.9
Harborage Condo Corp.	139	98.0	US 1, Mile Marker 98	Key Largo	74	15.0	0.00843	2.87%	0.00821	54.73%	James Howard (305)852-3271	1.9 / 47.7
Rock Harbor Club	140		97652 US 1	Key Largo	350	35.0	0.01446	41.31%	0.01123	32.09%	J.M. Walker	2.0 / 7.2

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SANITARY SEWER PACKAGED TREATMENT PLANT OPERATIONS REPORT

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											PHONE						
American Outdoors Key Largo	141		Route 1 - Box 384	Key Largo	296	15.0	0.01750	116.67%	0.01221	81.40%	(305)852-3042	Richard Harrick	1.9 / 6.6				
KOA Keys Restaurant	142	98.0	S.R. 5 - Mile Marker 98	Key Largo		7.5	0.00586	78.13%	0.00521	69.47%	(305)852-8054	Frank Gray	3.0 / 4.9				
Holiday by the Sea Condo	143		300 Ocean Drive	Key Largo	54	5.0	0.00280	56.00%	0.00238	47.60%	(305)852-4886	Holiday By the Seas	1.6 / 6.0				
Paradise Point M.H.P.	144		Seaside Avenue	Key Largo	14	3.2	0.00122	38.13%	0.00100	31.25%	(305)852-5000	Edward Waser	0.4 / 0.7				
The Landings of Largo	145		98000 Overseas Highway	Key Largo	973	100.0	0.06100	61.00%	0.05823	58.23%	(305)852-3121	Ann Peterson	1.3 / 3.7				
Kawama Yacht Club	146		1500 Ocean Bay Drive	Key Largo	815	80.0	0.05636	70.45%	0.05371	67.14%	(305)220-7366	Raymond J. Castellanos	1.6 / 10.0				
Pizza Hut	147		99020 Overseas Highway	Key Largo		10.0	0.00690	69.00%	0.00629	62.90%	Pizza Hut, Inc.		1.8 / 8.0				
Ocean Divers, Inc.	148		Caribbean Drive	Key Largo		7.5	0.00342	45.60%	0.00293	39.07%	(305)451-1113	Ocean Divers, Inc.	0.3 / 3.4				
Waldorf Plaza Shopping Center	149	100.0	Overseas Highway	Kcy Largo		30.0	0.01457	48.57%	0.01146	38.20%	(305)891-6806	Scott Ireland	1.7 / 4.4				
Florida Bay Resort STP	150		US 1 at Ocean Bay Drive	Key Largo	350	35.0	0.02579	73.69%	0.02329	66.54%	(305)852-9879	Raymond Daniel	1.4 / 3.0				
West Western Suites	151		201 Ocean Drive	Key Largo	80	20.0	0.00712	35.60%	0.00654	32.70%		M. Cianciotti					
Holiday Inn	152		US 1	Key Largo		30.0	0.02164	72.13%	0.01729	57.63%		Randy Goodell	1.2 / 7.8				

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Leeside Professional Bldg.	153	100.0	102900 Overseas Highway	Key Largo	56	3.3	0.00191	57.88%	0.00143	43.33%	Jack Gross (305)451-0413	0.3 / 2.1
Port Largo Villas	154	100.0	529 Caribbean Drive	Key Largo	112	15.0	0.02071	138.07%	0.01629	108.60%	Mart Resort Properties (305)451-4107	1.4 / 4.4
Coastal Waterway Trailer Park	155	101.0	US 1	Key Largo	90	5.0	0.00283	56.60%	0.00193	38.60%	L. Lamborn	0.7 / 2.1
Calusa Camp Resort	156	101.5	US 1 and Calusa Street	Key Largo	765	60.0	0.02779	46.32%	0.02107	35.12%	George Eager (305)451-0232	2.4 / 23.2
Glenn's Trailer Park & Campgr.	157	101.6	101600 Overseas Highway	Key Largo		22.0	0.01614	73.36%	0.01321	60.05%	Phillis Martin (305)451-2911	1.6 / 6.7
Key Largo Campground & Marin	158	112.5	US 1, Mile Marker 112.5	Key Largo		30.0	0.02114	70.47%	0.01515	50.50%	Ira Sochet (305)655-6541	1.6 / 5.5
Trailwinds/K. Mari Shop. Cntr	159	101.0	US 1, Mile Marker 101.2	Key Largo		20.0	0.01629	81.45%	0.01271	63.55%	K. Mart Development (305)643-5484	
Coral Reef State Park	160	102.0	P.O. Box 487	Key Largo	3500	45.0	0.03562	79.16%	0.03108	69.07%	Rec. & Parks/P. Sommers	1.8 / 2.2
Howard Johnson's	161	102.0	Overseas Highway 1	Key Largo	160	33.0	0.02836	85.94%	0.02107	63.85%	Bill Boston (305)451-1400	1.9 / 8.4
Paradise Pub	162	102.0	Overseas Highway	Key Largo	50	3.6	0.00139	38.61%	0.00107	29.72%	Ken Collins (305)451-1522	0.6 / 3.0
The Quyn Restaurant	163	102.5	102050 S. Overseas Highway	Key Largo		12.0	0.00679	56.58%	0.00457	38.08%	Gus Boullis (305)451-0943	
Koblick Marine Center	164	103.4	51 Shoreland Drive	Key Largo		15.0	0.00689	45.93%	0.00457	30.47%	Ian Koblick (305)451-1139	1.9 / 7.3
Florida Bay Club	166	103.5	US 1, Mile Marker 103.5	Key Largo	72	3.6	0.00485	134.72%	0.00330	91.67%	J. McGee	1.9 / 4.6

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											PHONE		
Senior Frijoles Restaurant	167	103.9	103900 B Overseas Hwy	Key Largo	190	4.6	0.00252	54.78%	0.00179	38.91%	(305)451-0101		
Italian Fisherman Restaurant	168	104.0	10400 Overseas Highway	Key Largo		15.0	0.00900	60.00%	0.00586	39.07%	Robert C. Story (305)451-1592		2.9 / 5.3
Moonbay Condo	169	104.3	104350 Overseas Highway	Key Largo		26.0	0.01601	61.58%	0.01214	46.69%	John Baimonte (305)852-4703		1.7 / 9.0
Tamarino Bay Club, Inc.	170	104.5	10450 Overseas Highway	Key Largo		15.0	0.00850	56.67%	0.00529	35.27%	Ronald Kennedy (305)451-0186		
Key Largo Elementary School	171	105.0	US 1, Mile Marker 105	Key Largo	675	25.0	0.01517	60.68%	0.01257	50.28%	Don Mummert (305)451-1074		1.9 / 7.7
Winn Dixie	172	105.3	US 1, and Blackwater Dr.	Key Largo	30	5.0	0.00375	75.00%	0.00283	56.60%	A. Henriquez Russ Post		1.6 / 6.4
Barefoot Key R.V. Resort	173	106.0	US 1, Mile Marker 106	Key Largo		15.0	0.00570	38.00%	0.00364	24.27%	F. A. Jackson		2.0 / 7.0
Gilbert's Motel & Marina	174	106.0	US 1 at Jewfish Creek	Key Largo	100	10.0	0.00612	61.20%	0.00379	37.90%	Paul LaCourse (305)451-1133		1.7 / 6.1
The Anchorage Resort	175	107.5	US 1, Mile Marker 107.5	Key Largo	200	10.0	0.00790	79.00%	0.00393	39.30%	Susan Walker (305)451-2611		5.5 / 8.7
Ocean Reef Club (Util. Co.)	176	12.0	31 Ocean Reef Drive	Key Largo	3532	450.0	0.24857	55.24%	0.17450	38.78%	Russell Post (305)367-2611		5.2 / 6.6
Flamingo STP	177	N/A	Everglades National Park	Flamingo	900	90.0	0.03171	35.23%	0.01757	19.52%	Everglades National Park (305)247-6211		3.6 / 2.1
Waters Edge Colony Park	178	5.1	Laurel and 2 Street	Stock Island		7.5	0.00825	110.00%	0.00757	100.93%	Marieta L. Kaszyk (305)296-1709		36.2 / 55.8

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SITE NAME	MAP REF #	M.M.	SITE LOCATION	KEY	SERVICE POP.	DESIGN CAP. (TOD)	AVERAGE PEAK DAILY FLOW (MGD)	% OF DESIGN CAPACITY	AVERAGE ONTHL. FLOW (MGD)	% OF DESIGN CAPACITY	RESPONSIBLE ENTITY PHONE	BOD / TSS
Mangrove Maria's	179	20.0	Overseas Highway MM 20	Sugarloaf		10.0	0.00181	18.10%	0.00113	11.30%	Thomas Kelly (305)745-3030	5.8 / 3.1
Casa De Los Tres	180	48.9	1501 Sombraero Blvd.	Marathon		1.5	0.00078	52.00%	0.00076	50.67%	Athanasia Anderson (305)743-5597	3.9 / 5.0
Sombraero Marina & Dockside Ln	181	49.6	35 Sombraero Blvd.	Marathon		3.5	0.00389	111.14%	0.00257	73.43%	Gorge Voit (305)743-7137	25.5 / 25.8
Susan's "Wobbly-Crab" Rest.	182	49.8	5230 Overseas Highway	Marathon		5.0	0.00115	23.00%	0.00093	18.60%	William Ortin (305)743-3417	11.2 / 16.2
Jim Green Marathon Vet. Clinic	183	52.5	11187 Overseas Highway	Marathon		5.0	0.00040	8.00%	0.00031	6.20%	Jim Green (305)743-7099	2.3 / 5.5
Fantasy Harbor Condo	184	76.5	Overseas Highway MM. 76	L. Matecumbe		1.2	0.00064	53.33%	0.00030	25.00%	N. Baillon & R. Moret (201)285-9000	
Sand Pebbles	185	80.5	80450 Overseas Highway	Islamorada		15.0	0.00336	22.40%	0.00143	9.53%	Ray Shambum (305)664-3681	1.6 / 3.4
Perry's Seafood Restaurant	186	82.5	Mile Marker 82.5	Islamorada		10.0	0.00375	37.50%	0.00164	16.40%	Hans Restuccia (305)664-3681	9.3 / 7.7
Harbor Lights Motel/Holiday Isle	187	84.9	P.O. Box 588	Islamorada		20.0	0.00604	30.20%	0.00246	12.30%	Joseph Roth	1.4 / 2.6
Tropical Reef Resort	188	85.0	84977 Overseas Highway	Islamorada		20.0	0.00512	25.60%	0.00254	12.70%	Charles Mingos	1.8 / 3.6
Ocean Harbor Condo	189	87.8	State Road 905	Islamorada		25.0	0.00233	9.32%	0.00121	4.84%	Steve Mirmelli (305)852-4460	1.2 / 8.0
North Key Largo Plaza	190	103.4	103400 Overseas Hy. #240	Key Largo		20.0	0.00963	48.15%	0.00621	31.05%	Doug Douglas (305)245-5547	
Lake Surprise II Condo	191	106.0	Lake Surprise Blvd/MM10	Key Largo		6.5	0.00031	4.77%	0.00020	3.08%	Fred Everson	1.9 / 6.3

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											PHONE		
I. Oasis	192	106.7	106690 Overseas Highway	Key Largo		2.6	0.00137	52.69%	0.00086	33.08%	(305)451-5570		0.4 / 0.9
Cross Key Marina/Restaurant	193	112.5	Morris Avenue	Cross		3.0	0.00182	60.67%	0.00121	40.33%	Ray Vera (305)451-2779		
Marathon Trailerama	194	47.9	1571 Overseas Highway	Marathon		20.0	0.00696	34.80%	0.00440	22.00%	Vincent Alexander (305)743-6962		31.8 / 34.3
The Sanctuary	195	100.0	US 1 & Bay Hammock Dr.	Key Largo		10.0	0.00621	62.10%	0.00414	41.40%	Harold Kessler (305)271-1088		1.6 / 5.0

Table 10.5
Facilities Discharging to Surface Water

NAME	MAP REF
Venture Out @ Cudjoe Key	15
US Coast Guard Station Marathon	66
Islamorada	133
USNAS Boca Chica Field	7
Waters Edge MHP	178
Fiesta Key KOA	83

Source: Florida Health and Rehabilitation Services, 1991

As permits expire, it is necessary for these facilities to come into compliance with current criteria. It becomes more cost effective for smaller facilities to change the method of effluent disposal and most facilities change to a Class V well constructed in accordance with Chapter 17-28 FAC.

There are certain tools available to the DER for establishing compliance or noncompliance with the waste treatment standards. One such tool is the information submitted on the self-monitoring operational reports. The information provided on these reports and monitoring frequency depends on the design capacity and method of effluent disposal.

The DER may also take enforcement action based on its own sample collection activities. This activity is generally combined with their policy of facility inspections at a minimum frequency of once per year.

Effective July 1991, an applicant renewing a permit is required to submit a Capacity Analysis Report. This information will assist the DER in evaluating facility performance as it relates to design capacity.

Currently there are 13 wastewater treatment plants under some kind of enforcement action by DER (see Table 10.6). The first enforcement action that the DER initiates when a facility is found to be in non-compliance is a Warning Notice. Most individuals responsible for the operation of a facility will attempt to solve their differences with DER at this stage. If the differences cannot be resolved, the DER attempts to execute a Consent Order. With a Consent Order, the respondent agrees to compliance issues and schedules. If a Consent Order is not attainable the DER will pursue legal action.

Table 10.6
Facilities Currently under DER Enforcement Action

NAME	MAP REF	STATUS
Sunset Inn	101	Exceeded effluent limitations CASE RESOLVED
Coconut Grove	4	Did not comply with C.O. DER INITIATED LEGAL PROCEEDINGS
Waters Edge MHP	178	Did not comply with C.O. DER INITIATED LEGAL PROCEEDINGS
Royal Plum Condo	74	Unauthorized connection CASE RESOLVED
Little Palm Island		IN COMPLIANCE WITH C.O.
Sunshine Key Travel Park	24	IN COMPLIANCE WITH C.O.
Galaway Bay MHP	27	IN COMPLIANCE WITH C.O.
Ocean 80	90	Signed C.O. in December '91
Key Haven Utility	6	IN COMPLIANCE WITH C.O.
Lorelei	102	Operating without permit IN PROCESS OF OBTAINING PERMIT

Source: Florida Department of Environmental Regulation, 1991

10.3 Assessment and Inspection Programs

10.3.1 Septic Tank Inspection Program

The septic tank/cesspool inventory being conducted in conjunction with the Comprehensive Plan will provide the database for identifying unregulated and inoperative septic tanks and cesspools for compliance with the provisions of Section 9.5-294(a)(3) of the Monroe County Land Development Regulations. These regulations require that all on-site wastewater treatment facilities be inspected by a licensed contractor or engineer every three years to determine whether or not that facility is meeting performance standards. At the present time, these inspection requirements are not being enforced. In recognition of this HRS has proposed a mandatory septic tank inspection program which would be financed by an assessment on county property taxes. Exempted from this assessment would be those homes and businesses less than three years old, systems which have records of repairs within the last three years, and properties serviced by DER regulated sewage treatment plants. The proposal places the responsibility for conducting the field inspections and followup permitting and inspection for repairs on HRS and the responsibility for data compilation and maintenance on Monroe County. The

main thrust of the proposed program would be the enforcement of regulations related to illegal septic systems and cesspools.

10.3.2 Water Quality Monitoring

The waters of the Florida Keys historically have been considered pristine and unadulterated, but with increasing population and development pressure over the past decade and a half, concern has arisen that water quality is being degraded by development activities. The natural assets of the Florida Keys are the basis of the tourism and fishing industries and are largely dependent upon maintenance of good water quality. Unchecked degradation of water quality would undoubtedly alter marine communities, with unpredictable but probable detrimental effects upon the beneficial uses of nearshore waters. Further deterioration to the point of creating a public health hazard would be catastrophic (CH2M Hill, 1979).

Discharges to surface waters are regulated under Chapters 17-3 and 17-4 of the F.A.C., and cannot depress water quality below specified criteria. The waters of the Florida Keys have been classified as Class III waters with designated uses for recreation, and propagation and management of fish and wildlife. In April 1985 the waters of the Florida Keys were reclassified as Outstanding Florida Waters (OFWs), and as such, their existing ambient water quality may not be degraded as a result of any human activity or discharge.

A. Previous Water Quality Assessment Programs

The Florida Keys OFW Monitoring Study was conducted in 1985 to collect baseline data on water quality for ambient and artificially created waters within the Florida Keys. A total of 165 stations were sampled from Key Largo to Key West along the Florida Bay side and Atlantic Ocean side of the Florida Keys. Sampling which began January 8, 1985, was concluded February 20, 1985. Due to the extensive surface area of the waters in the Florida Keys (120 miles bayside and 120 miles oceanside) and limited manpower and time available, the number of stations and parameters were kept at a minimum. Monitoring points were equally distributed between bay and ocean to provide uniform coverage. A total of 81 stations (49 ambient and 32 artificial waterways) were monitored along the oceanside of the Florida Keys, while a total of 84 stations (46 ambient and 38 artificial waterways) were sampled along the bayside. Artificial waterways sampled included canals, boat basins and marinas adjacent to trailer parks, single- and multiple-family dwellings, and commercial operations. Ambient stations were located approximately 1/4 mile offshore in most cases with occasional controls located within mangrove creeks.

As the data indicates, all ambient stations monitored in this survey exceed Class III standards. On the other hand, the artificial waterways show varying degrees of degradation. Most artificial waters are impacted by reduced circulation due to excessive depths and the orientation and configuration of the design. This compounds the detrimental influence from uncontrolled stormwater runoff, septic leachate and the accumulation of floating organic debris. All of the factors, as the data supports, degrade the water quality often below existing standards. Future increases in the population adjacent to these waterways will only result in additional degradation. Serious measures would have to be implemented to slow or reverse this trend. The 205-J study completed by DER in 1989 addresses these specific sources, and includes results and recommendations regarding the necessity and feasibility of central collection and secondary treatment of these sources.

In addition, a state-wide summary describes the extent and nature of nonpoint source pollution of surface waters in the Florida Keys Basin as reported by DER in 1989. The basin summary contains a general description of the basin, an estimate of the extent of the assessment (10 percent), and a discussion of specific nonpoint pollution problems in the basin.

Most of the nonpoint source problems reported in the 1989 Report are in the vicinities of Key West and Marathon. In the Key West area, Safety Harbor, Key West Harbor, Garrison Bight, Riviera Canal, and Cow Key Channel are moderately impaired as a result of urbanization, live-aboards, boaters and boat and marina activities. Nutrients, bacteria, oils, grease, habitat alteration, turbidity and odor affect all of those water bodies. Garrison Bight is additionally affected by low dissolved oxygen (DO), sediments, septic tank seepage and declining fisheries. The natural flow through Garrison Bight has been altered by hydrologic modification. Flow alteration is also reported for Key West and Safety Harbors. Landfills on Stock Island are located very close to the water and are sources of sediments and metals which threaten Gulf waters. Landfills similarly threaten Gulf waters near Long Key.

Nonpoint problems in Marathon have not progressed to the high level of impairment apparent in Key West, but threatened conditions are prevalent. Urbanization, septic tank seepage and hydrologic modification (canals) are sources of sediments, nutrients, bacteria, debris, oils and grease. As a result, odor and turbidity problems are increasing, dissolved oxygen and fisheries are declining, and there has been loss of natural habitat.

On Plantation Key, marina activities and septic tank seepage have contributed to the moderate impairment of Tavernier Creek. Nutrients, bacteria, debris, oils and grease are associated with low DO, odors, turbidity, and loss of habitat. Lake Largo on Key Largo is similarly moderately impaired. Surface water in the vicinity of Holiday Isle, a development on Windley Key, is threatened by urbanization.

In addition, a domestic wastewater nutrient study is currently underway in order to determine the impact of secondary treatment plant effluent discharged into Class V injection wells on adjacent surface waters. The subject of the study is a 0.020 MGD extended aeration plant recently built in conjunction with a new development project located in Saddle Bunch Key, called Blue Water RV Park. A total of seven monitoring wells and seven surface water stations will be monitored for various parameters. Monitoring will take place before and after the plant begins operation, for a period of two years, in order to assess whether nutrient enrichment occurs in surface waters adjacent to the boreholes after the treatment plant begins to discharge.

In February 1990, Florida Keys Land and Sea Trust, completed the study, "Ambient Water Quality Assessment in the Middle and Lower Florida Keys During Summer, 1989." This study, supported by the MacArthur Foundation and Monroe County, represents a comprehensive ambient water quality assessment for nearshore waters of the Middle and Lower Florida Keys. The hard data and observations of nearshore nutrient enrichment, algal blooms, coral disease, seagrass epiphytization, hypoxia, and frequent violations of state DO standards throughout nearshore water of the Florida Keys as reported by the Sea and Land Trust study indicates that these waters are not pristine, as generally viewed by the tourist or layman, but in fact stressed by nutrient loading and associated eutrophication. In addition, the study concludes that within Monroe County as a whole, OSDS are the single most

important contributor to nonpoint source loading. These findings underscore a critical need for expanded monitoring efforts to further our knowledge of the extent and nature of degraded nearshore waters.

However, data and assumptions found in the "Ambient Water Quality Assessment in the Middle and Lower Florida Keys During Summer, 1989" and "Final Report on the Effects of On-site Sewage Disposal Systems on Nutrient Relations of Groundwater and Near Shore Waters of the Florida Keys" can only be utilized as generalized material, until verified.

Although a county-wide water quality monitoring program was called for under the "Area of Critical State Concern" designation in 1974 and the Monroe County Comprehensive Plan of 1986, neither Monroe County nor DER has initiated a comprehensive County-wide monitoring program. NOAA has recently embarked on a program through the creation of the National Marine Sanctuary (NMS) to improve water quality within the sanctuary boundaries.

B. Future Water Quality Monitoring Needs

The recent designation of the Florida Keys as OFWs alters the format of future water quality monitoring by DER in Monroe County. Rather than simply investigating areas suspected of impact for violations of Class III water quality standards, the DER must measure ambient water quality in order to document future degradation of existing conditions. Although Class III standards still serve as minimum criteria under the OFW classification, any significant reduction of water quality can incur enforcement by DER if sufficient baseline data is available.

The advantage of the OFW designation is that it eliminates the ambiguity of establishing the concentration at which a pollutant becomes detrimental to environmental quality, and instead simply prevents any significant change of existing water quality, regardless of the known or unknown effects of constituent concentrations. A future monitoring study by DER in the Florida Keys must be designed with the understanding that suspected changes in water quality cannot be determined without adequate background or baseline data.

As stated previously, the aim of future monitoring in the Florida Keys should be to document significant degradation of water quality, where "significant" is defined on the basis of adverse impacts on man's beneficial uses of the water. Those beneficial uses, such as swimming, fishing, and diving, are directly or indirectly dependent upon maintenance of a healthy ecosystem.

The Quality Assurance Section of DER is currently in the process of developing Chapter 17-160, F.A.C., titled Quality Assurance. These rules will identify specific quality assurance requirements for all Department programs and activities. In addition, these rules will also define the types of Quality Assurance Plans that must be submitted, and the procedures for obtaining Quality Assurance Plan approval. The QA Section is also revising the document DER Guidelines for Preparing Quality Assurance Plans (DER-QA-001/85) published in 1986, to provide additional information in preparing QA plans for the Department. This document, DER Manual for Preparing Quality Assurance Plans (DER-QA-001/90), is in draft form and pending adoption.

Any and all future monitoring procedures should be approved by the DER and the EPA for compliance with pending Quality Assurance requirements of F.A.C., Rule 17-160 and 40 CFR, Part 136 to ensure that proper quality control guidelines are followed during data collection and reporting.

In its Preliminary Policy Direction for the Comprehensive Plan adopted in February, 1991, the Monroe County Board of County Commissioners adopted policies to link future development decisions to water quality monitoring and to implement the coordination of a monitoring network and map water quality trends on a Geographic Information System. One of the goals of the proposed program is to link specific water quality problems in a given area to specific development activities. The identification of the location of unpermitted septic systems and cesspools will be an important component in tracing point sources of pollution to individual or concentrations of inadequately functioning septic tanks and cesspools once the nearshore water quality monitoring program is implemented.

10.3.3 Resource Management

Continued increase in the number and type of wastewater treatment and disposal systems in Monroe County will inevitably increase concerns for the protection of public health and water quality. Previous sections of this Sanitary Sewer Element have focused on growth management strategies and improved wastewater facilities to correct existing deficiencies and accommodate future demands. Equally important is the need to implement resource management strategies which recognize the reuse of wastewater effluent as a viable resource, and which, through water conservation techniques, effectively reduce the wastestream that results in potential threats to public health and water quality. Through the implementation of revised Land Development Regulations and building codes, and improved public educational efforts, individual and cumulative impacts of sewage treatment and disposal can be reduced.

A. Water Conservation

There are three major reasons to emphasize water conservation when developing land for residential, commercial, industrial, or other use. All or only one or two of the reasons may apply to a particular development. All should be given consideration as appropriate to the project. The major reasons are:

- (a) To conserve a valuable resource in its most natural or purest state;
- (b) To lessen or minimize the waste load to a central wastewater treatment facility; and
- (c) To minimize the waste load to on-site wastewater facilities.

By minimizing the quantities of water that are used, wastewater processing becomes an easier, less costly process. Growth moratoriums can be eliminated or slowed by instituting sound water conservation measures when overloaded treatment plants are the cause. This same principle applies to on-site treatment facilities; an overloaded system may still be usable if the volume of wastewater is significantly decreased. In each of these instances, monetary as well as environmental costs are at stake. The building of new treatment plants or the expansion of existing plants when not absolutely necessary becomes a financial burden on a community.

Additional disposal areas required to compensate for overloaded individual on-site systems can also be a costly burden to the homeowner or businessman. If there are too many overloaded systems in an area, the construction of a treatment plant once again comes into the picture with its associated costs. For the land developer, economics place high on the cost-benefit scale. Environmental concerns must also place high. Minimal damage to the environment means a better quality of life and less future impact on economics and health.

B. Wastewater Recycle/Reuse Systems

Wastewater recycle and reuse systems collect and process for subsequent use either all of the wastewater or a portion of it produced by particular activities. The intended reuse of the water determines the performance requirements of a wastewater recycle system, and is regulated accordingly by the DER under F.A.C. Rule 17-610. Most systems only process wastewater from bath facilities, bathroom sinks, and laundries for reuse in flushing water carriage toilets and outdoor irrigation. There are also on-site systems that process all wastewater from an individual establishment for reuse as potable water.

In many water short areas, wastewater reuse represents a feasible, cost-effective approach for effluent disposal and also reduces total demand for potable water. However, wastewater reuse in the Florida Keys is limited at this time to irrigation of two golf courses at Marathon and Key Colony Beach, which are inadequate in area to accept more than a portion of local flows.

Since many areas of the Florida Keys are periodically inundated with saltwater and have little soil mantle, agricultural development in the Florida Keys is minimal, including only five nurseries. This also probably reflects high land costs that would tend to make most agricultural operations noncompetitive. For the same reasons, there are few areas of grassland requiring irrigation, such as median strips, parks, and playing fields. The cost of piping filtered secondary effluent to the few potential sites would be very high.

With appropriate treatment, effluent may be suitable for water supply uses at some time in the future, in which case underground storage and recovery as described in the Monroe County 201 Facilities Plan may prove to be desirable for aesthetic and treatment purposes. At the present time, wastewater reuse is not a feasible method for effluent disposal in widespread applications; however, its potential resource value should not be precluded from future consideration.

10.3.4 Development of the Sanitary Wastewater/Stormwater Master Plan

As previously discussed, it is expected that a Sanitary Wastewater/Stormwater Management Master Plan (SW/SMMP) will be undertaken and completed by 1995. One of the components necessary to be included in this study is an identification and assessment of areas which are not suitable for septic tank use because of unsuitable soils, inappropriate densities and age and type of existing septic systems. The septic tank and cesspool inventory followed by the proposed HRS inspection program is expected to partially provide the required data and assessments necessary as input to the SW/SMMP.

10.4 Proposed Level of Service (LOS) Standards

The levels of service standards for OSDS and package treatment plants will, as a result of the SW/SMMP, be modified or replaced by permanent standards that reflect the necessary levels of treatment and disposal throughout Monroe County.

10.4.1 Package Treatment Plants

Package treatment plants performance is monitored through the submission of monthly operating reports and an annual summary to DER. The interim level of service standards for quantity and quality will be determined based on the individual package treatment plants design capacity and the ability of the plant to meet the effluent quality and operational standards set forth in Chapter 17-600, F.A.C.

The SW/SMMP will attempt to determine the effects of treatment plant effluent on water quality and shall recommend a LOS to supercede the existing LOS to minimize those effects determined to be detrimental to the designated OFW.

10.4.2 On Site Disposal Systems (OSDS)

The interim level of service pending completion of the OSDS evaluation and feasibility assessment for the SW/SMMP for on-site disposal systems will be in compliance with the requirements of the most recent versions of Chapter 10D-6 and Chapter 10D-6, Part II, F.A.C.

The interim level of service standards for OSDS will be superseded and replaced by permanent standards established as a result of completion of the SW/SMMP based on environment carrying capacity which addresses nutrient loading and maintains the quality of nearshore waters.

10.4.3 Present and Projected Future Ability to Meet Level of Service Standards

The level of service (LOS) standards presented are intended to provide an interim LOS in the remedial plan for wastewater treatment and disposal pending the completion of adequate research and testing to determine whether or not alternative methods are appropriate for use in the Florida Keys.

As previously indicated, a combined SW/SMMP is projected for completion by September 1995. One of the objectives of the plan is to determine the necessary level of treatment required in all developed and undeveloped areas of Monroe County. The plan will specify a rate structure for service as well as a funding mechanism for implementation. The plan will at a minimum take into consideration soil suitability, water table, degradation to nearshore water quality, and land use. Prior to implementing the SW/SMMP, the legal implications of an interim ordinance imposing at least the established density requirements of 10D-6 should be explored. OSDS treatment alternatives need to be considered for lots not meeting the established density criteria. The plan will include researching the feasibility of nutrient removal for OSDS and package treatment plants and include testing of prototypical OSDS systems in order to ascertain their performance and applicability for use under actual conditions.

10.4.4 Key Carrying Capacity Limitation, Facilities Inadequacies and Policy Constraints

The results of the SW/SMMP will indicate the location for and the type(s) and level of wastewater treatment systems to be utilized. Although Comprehensive Plan policies specifying methods of sanitary wastewater treatment systems and applicable locations and densities may affect the cost and distribution of development, sanitary sewer systems are not expected to be considered a carrying capacity limitation.

10.5 Sanitary Wastewater/Stormwater Management Master Plan

Numerous purpose and site specific studies have been conducted regarding the use and effect of various sewage treatment and disposal systems in Monroe County. Many of these research efforts have been directed at identifying specific impact areas or biotic communities in the nearshore waters of Monroe County while not being designed specifically to identify the causative discharge points which, in most cases, were beyond the scope of these studies. Although these studies will be reviewed and when applicable be incorporated in the Sanitary Wastewater/Stormwater Management Master Plan (SW/SMMP) design methodology, it is now recognized that a comprehensive effort beyond the magnitude of anything yet undertaken will be required. Implementation of the SW/SMMP will affect the fiscal, public and private operational characteristics presently in place related to drainage and sewage treatment systems utilized in Monroe County. Successful development and implementation of the SW/SMMP will require expertise of both the engineering and scientific disciplines as well as the commitment to finance the study at a level that allows definitive conclusions and recommendations to be developed. The success of the study also requires that the fiscal and political commitments at varying levels, both government and regulatory, remain in place throughout the duration of the development and implementation phases.

The goal of the SW/SMMP is to identify point and non-point sources of pollution and the associated water quality degradation in the Florida Keys. Because of the interrelated nature of wastewater effluent discharge and stormwater runoff effects on water quality and in order to maximize the cost effectiveness of the Plan, the SW/SMMP will address both wastewater treatment and stormwater management. The Plan will ultimately define the type of wastewater treatment and disposal methods and stormwater management techniques to be utilized by geographic service area. Allowable densities as permitted through Land Development Regulations will be a consideration in defining the types of treatment systems and may preclude the use of certain systems in area characterized by high density development. The conclusions of the SW/SMMP will be integrated through the amendment process into the Comprehensive Plan. The Monroe County efforts will be integrated with the activities of National Oceanic and Atmospheric Administration's (NOAA) Marine Sanctuaries Program (MSP) which was initiated in October 1990. This goal will be accomplished over the next four years in three phases as outlined below.

10.5.1 Phase One: Design, Analysis and Approval of Water Quality Monitoring Network
(March 1992 - September 1992)

In order for Monroe County to benefit financially by coordinating its efforts with those of the MSP and to meet the requirements of the Stipulated Agreement between the County and DCA, it is imperative that Phase One be initiated by March of 1992. The MSP is undertaking the collection and synthesis of a voluminous data base pertaining to water quality degradation and its effects on the biota. Many of the components of the MSP, especially the data gathering and analysis efforts, will parallel the data requirements of the SW/SMMP. By integrating the County's master planning efforts and time frame for completion with the MSP schedule, the efforts of both agencies can be complemented in terms of available expertise. In addition, the integrated effort will allow for the coordination of conclusions and implementation activities.

A. Defining the Research Parameters and Data Collection Methodology

Based on initial coordination meetings conducted between the Monroe County Comprehensive Plan and Marine Sanctuaries planning teams, it is evident that much of the data required to complete the SW/SMMP has been and continues to be generated by previously conducted research efforts and the present MSP activities. Much of the previously conducted research efforts were site specific with the goals not specifically applicable to the data analysis and comprehensive conclusion requirements of the SW/SMMP. Further the MSP water quality research efforts are an integral component of the overall SW/SMMP process but must be complemented with data collection and analysis specific to wastewater and stormwater issues and related effects. The Monroe County/MSP coordination effort must continue on a routine basis to assure that the best data is available in a manner that complements the efforts of both entities. If Monroe County is not able to initiate development of the SW/SMMP in a manner that parallels the MSP water quality data collection and analysis efforts in terms of the research and time frames, the ability to take full advantage of this data may be endangered.

B. Data Organization

The SW/SMMP efforts will, because of its complexity in terms of the amount and diversity of the data collected, be best served through utilization of a Geographical Information System (GIS). Establishment of the database on the GIS will facilitate subsequent data analysis, utilization and interpretation throughout and beyond the planning process. The database is expected to consist of at a minimum the location and specifications of existing sanitary wastewater treatment facilities, location, type and quantity of discharge, associated discharge quality parameters such as bacteriological quality, nutrient loading, BOD, COD, metals, TSS, and toxic or hazardous components. Biotic samples will be collected from various target populations or communities and will be analyzed for species composition and diversity, standing crop, biomass and individual organism condition. The initial data collection and utilization of GIS will establish the database from which ongoing planning and management decisions can be made. Modifications to the database can be easily incorporated as needed based on interactive data analysis.

C. Remote Sensing

Various remote sensing techniques will be employed to identify specific features and surface water quality conditions such as algal blooms, thermal plumes, turbid water plumes, denuded substrata in shallow waters, and previously identified discharges. The technique is particularly useful in identifying specific impact loci with onshore discharges thereby relating cause and effect mechanisms. Florescent tracer dyes will be utilized as appropriate to enhance the location of various plumes and generally improve on the usefulness of the data generated by this technique. This feature will enhance the design team's ability to select the most appropriate data and station locations for impact analysis and minimization.

D. Selection and Approval of Data Parameters and Monitoring Stations

Based upon the results of the previously discussed research effort, a specific data collection protocol will be designed which will meet the data requirements and the SWSMMP's objective of improving nearshore water quality. By incorporating the data generated during the source analysis with previously known and project identified impact areas, the number and location of monitoring stations can be kept to a minimum while still providing the necessary information so that informed decisions can be made. To ensure the scientific validity of the study design, a comprehensive review of the monitoring protocol will be undertaken by the appropriate governmental entities and the scientific community during these initial states of the planning effort. This effort will attempt to eliminate the possibility of design team subjectivity affecting important environmental monitoring protocol design decisions. In conjunction with the HRS experimental and prototypic alternatives, OSDS will be selected for evaluation in Phase Two of this study.

E. Funding Sources

The Florida Keys has been designated a National Marine Sanctuary, Outstanding Florida Waters, and an Area of Critical State Concern. In addition, the Nature Conservancy has designated the Keys one of the ten most significant ecological communities in the world. Significant initial work efforts will be directed to identifying additional and alternative funding sources on the Federal, State and private levels.

The Florida Keys National Marine Sanctuary Program has in the Phase II, Task 5 - Funding Sources Report (September, 1992 Draft) identified potential sources of funding for implementation of any necessary institutional and corrective actions related to water quality. The information used in this report has been gathered from review of Florida State regulations related to funding and analysis of funding options used in similar activities. This report should serve as an inventory of potential options that can be used to address certain aspects of the water quality issues in the FKNMS. (Batelle. September, 1992 Draft).

A wide range of options have been identified for addressing water quality issues in the Keys. The agencies and institutions that will be involved in implementing these options are diverse in terms of capabilities and resources. Many of the funding mechanisms discussed in this report could be used to address a number of different management and engineering options, and it will be the task of the agencies and institutions involved to determine which options are available to them. At this stage in the development of management plans for the FKNMS, no single preferred option, or set of options, has been recommended for addressing water quality issues in the Keys. Because of this, it is

difficult to determine the type and level of funding will have on the local economy. For this reason, this report does not recommend a specific suite of funding options to use nor does it contain an extensive analysis of economic impacts or potential revenue generation. (Batelle, September, 1992 Draft).

Following is a list of the potential funding sources identified in the Draft Task 5-Funding Sources Report:

Municipal Bonds

- General Obligation Bonds
- Revenue Bonds
- Certificates of Participation
- Pooled Bonds
- Private Activity Bonds

Tax Finance

- Florida State Level Tax Revenue
- Florida Local Level Tax Revenue
- Taxation Related to Water Quality Improvement
 - Cigarette and Other Tobacco Products Tax
 - Utilities Tax
 - Motor Fuels and Petroleum Production Taxes
 - Tourist Development and Impact Taxes
 - Foodfish and Shellfish Taxes
 - Litter Control Tax
 - Aquatic Lands Leasehold Tax
 - Pollutants Tax
 - Impact Taxes
 - Property Taxes
 - Sales Tax Surtaxes

Grants and Loans

- Federal
 - U.S. Environmental Protection Agency (EPA)
 - U.S. Department of Agriculture
 - Department of Housing and Urban Development
 - National Park Service
 - U.S. Department of Commerce
- State

Rates

- Utility Rates
 - Capacity Futures
- On-Site Sewage Disposal Systems

Fees

- User Fees
 - Moorage Fees and Privilege Fees
 - Discharge and Run-Off Fees
 - Inspection Fees
- Tolls
- Impact Fees
 - Development Fees
 - Use Impact Fees
- Fines and Penalties
- Licenses and Permits

- Fishing and Hunting
- Boat Licenses and Registration
- Permits
- Special Assessments
- Donations/Charitable Trusts
- Privatization
- Operations Contracting
- Construction and Operations Contracting

10.5.2 Phase Two: Data Collection, Monitoring Analysis (October 1992 - September 1994)

The magnitude of the water quality program has been generally identified but it is dependent upon the findings of the Phase One analysis. Phase Two, Data Collection, Monitoring and Analysis, consists of undertaking the vast majority of data gathering primarily associated with the environmental quality monitoring programs.

A. Establishment of Monitoring Stations

The monitoring station locations will be established in the field and permanently identified by one of several techniques. Discrete artificial canal, nearshore, offshore or deep water reference stations will be recorded by physical means in the field as well as electronic means within the GIS system. The producibility and subsequent trend analysis of the collected data are directly dependent upon the successful location of all sampling stations. It is therefore imperative that all stations be easily accessible and replaceable under varying climatic conditions. Aquatic, estuarine and marine monitoring will be conducted by a combination of sample collection and off site analyses as well as in situ analyses.

B. Water Quality Sampling

Water quality samples will be collected and analyzed for the previously identified parameters from all stations at least quarterly and in direct relationship to specified conditions which directly impact nearshore water quality. Such conditions include, but are not necessarily limited, to catastrophic spills, abnormal tidal conditions, local and near field storm events, and special events.

C. Biotic Community Sampling

Various biological samples will be collected both from the water column as well as benthic substrate. These collections will include both faunal and floral associations to produce a broad based data set. These samples will be collected from the previously identified water quality sampling stations or appropriate reliable near field locations. The purpose of these collections will be to identify the health of the individual organisms as well as the health of the community associated with the specific water quality at that station.

D. Soil Samples

During the collection of benthic substrata samples, offshore substrata collections will be made to identify associated geophysical conditions. Onshore soil borings will be performed to identify specific soil conditions and to determine their hydrogeological properties relative to transmissivity, bacteriological attenuation, nutrient uptake, and adsorptive and absorptive capacities. These stations will be located as a result of facilities location reviews. Based on a review of soils diversity throughout the Keys, sufficient samples will be taken to identify soil specific features and eliminate monitoring protocol induced variability.

Evaluations of the performance of existing tanks at various population locations and under varying soil conditions will be undertaken. The level of density the system is expected to serve will be a consideration in the septic tank sampling and evaluation. These evaluations will consist of a treatment effectiveness, effluent hydrology and the relationship to the soil sample analysis described in Section 10.5.2D above.

F. Wastewater Treatment and Disposal Methods Evaluation

The following treatment and disposal systems will be evaluated based on the future land use scenario, associated allowable densities, and adaptability to environmental constraints. Treatment methods that will be evaluated include, but are not limited to, standard septic tanks, aerobic units, alternative OSDS, package treatment plants (secondary treatment, AWT, nutrient removal), and regional wastewater treatment plants. Effluent disposal options to be evaluated will include recharge, shallow and deep well injection, ocean discharge, irrigation reuse and wetland discharge.

G. Evaluation of Alternative OSDS

Alternative OSDS will be identified and tested under actual operating conditions. These test systems will be installed under the HRS guidelines contained in Chapter 10D-6.049 FAC. These guidelines specify that the use of an experimental system may require the establishment of procedures for routine maintenance, operational surveillance and environmental monitoring to ensure that the system is functioning properly. Alternative OSDS will be evaluated based on treatment effectiveness, specifically nutrient removal and economic feasibility. To confirm the effectiveness of any alternative OSDS the monitoring of discharges will be conducted for identical parameters and at the frequency utilized in the previously discussed water quality monitoring efforts. The discharges will be sampled for water quality parameters including bacteriological quality, nutrient concentrations, BOD, COD, metals, and TSS. It is expected that this monitoring and evaluation program will take a minimum of two years and should be initiated at the onset of Phase Two of the SW/SMMP.

H. Remote Sensing

Some or all of the following techniques will be utilized, as appropriate, in order to ascertain areas of discharge into surface waters that will require on site field analysis: color infrared aerial photography, multi spectral high altitude or satellite imagery, vertical black and white photography, and other techniques which may be identified during the Phase One project design. Following the identification of important discharge points, florescent tracer dyes will be utilized to confirm target areas of the nearshore waters which will be analyzed. The identification process may include both remote sensing techniques as well as water borne sampling to identify the aerial extent and time of passage of individual discharge plumes. This effort will be valuable in identifying specific parameters which will be analyzed for in the sediment and water column. The associated sessile biotic assemblage entrained within continuous plume areas will yield further valuable data on the realized affects of the measured discharge constituents. By interrelating data generated on the biota and discharge parameters, informed decisions can be made regarding the source discharge.

I. Phase Two Conclusions

Utilizing the data collected during Phase Two and the subsequent analysis and conclusions, the policies and parameters which will serve as the basis for development of the SW/SMMP will be stipulated. These conclusions are expected to confirm or rescind hypotheses associated with type and performance of OSDS applicable to the specific conditions, the use of boreholes, stormwater runoff attenuation, water quality trends identified in ongoing monitoring, recommendations associated with effluent, treatment levels of each type of system, and the systems' ongoing appropriateness in the Keys environment. The conclusions will be based upon information generated by the SW/SMMP, as well as other ongoing or recently completed ecological analyses of the nearshore region of the Florida Keys. As previously stated this effort will incorporate the cause and effect relationships between discharges, water quality degradation and biotic impacts or responses.

10.5.3 Phase Three: Development of the Sanitary Wastewater/Stormwater Management Master Plan (October 1994 - September 1995)

A. Presentation of Findings and Conclusions

A working paper containing the results of the Phase Two Conclusions will be developed to present findings of the study to the entities having jurisdiction and interest in minimization of water quality degradation. Based on these findings, the paper will contain the recommended policies and parameters for final development of the SW/SMMP. Results of the governmental agency/public review and any additional relevant input will be utilized to solidify these policies and parameters.

B. Final Development of the Sanitary Wastewater/Stormwater Management Master Plan

The Sanitary Wastewater Element of the SW/SMMP will contain the following components:

- o The ultimate type of treatment and effluent disposal system to be utilized by geographic service area will be identified and graphically depicted.
- o Mandatory level of treatments for new and replacement systems including the criteria for attaining the adopted level.
- o Schematic depiction and estimated construction costs associated with any necessary major support infrastructure for sanitary sewer facilities.
- o Potential funding sources available to implement requires capital improvements associated with the recommendations contained in the Master Plan.
- o Proposed rate structure for publicly owned and operated sewer system.
- o Recommendations for retrofitting specific existing facility deficiencies found to be causing significant water quality degradation and development of associated costs.
- o Recommended ongoing monitoring program, beyond the adoption of the Sanitary Wastewater Component of the SW/SMMP, designed to assess the effectiveness of improvements and amended adopted levels of service on environmental conditions.

The Stormwater Management element of the SW/SMMP will contain the following components:

- o Recommendations for retrofitting specific existing facility deficiencies found to not be meeting the adopted levels of service standards.
- o Evaluation of the establishment of a Stormwater Utility as an equitable means of implementing the identified stormwater management improvements.
- o Recommended ongoing monitoring program beyond the adoption of the Stormwater Management component of the SW/SMMP to assess the effect of implementing stormwater management improvements and amended levels of service on environmental conditions.

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